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Annual Report

of the

Department of Agriculture in the Bombay Presidency

For the Year 1925-26

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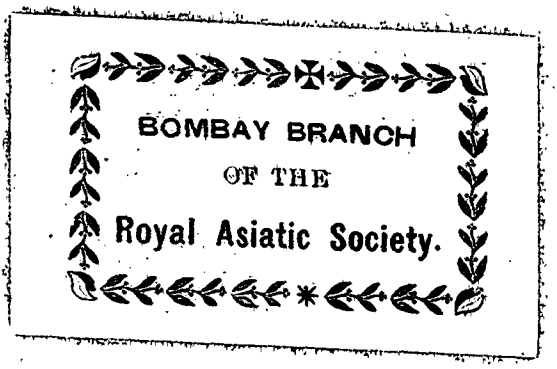

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ANNUAL REPORT OF THE DEPARTMENT OF AGRICULTURE, BOMBAY PRESIDENCY, 1925-26

In the report on the operations of the Department of Agriculture in the Bombay Presidency for 1924-25, I noted the very hopeful position which had been reached regarding the general agricultural awakening and the extension of agricultural improvements. This hopefulness has been justified in the year on which I am now reporting, for despite a season, which was on the whole unfavourable, there has been an increasingly widespread interest in agricultural advance, the improvements which we are able to place before the people are more than ever appreciated, and the demand for further help and improvements is so developing that it is often impossible to meet it with the strength and the organisation that are available. The year has been, moreover, noteworthy for the announcement of the appointment of a Royal Commission on Agriculture, and for the preparation of the first Presidency Agricultural Show at Poona. The actual occurrence of the Show, and the actual coming of the Royal Commission are matters which have not taken place in the year under report; but the widespread interest aroused by both these matters shows how living is now the interest in agricultural advance.

The year 1925-26 itself was not a favourable one. I have rarely known a monsoon which was so uncertain as to give rise to an equal amount of anxiety. At one time, early in September 1925, it almost looked as if a famine was imminent, and though this was saved by the occurrence of widespread rain at the critical moment, yet the season as a whole was, at best, moderate. It was definitely poor over a large part of Gujarat, East Khandesh, and the Eastern Deccan and Karnatak; in the central strip of the Deccan and the Karnatak it was fairly satisfactory, while in the *ghat* regions and the Konkan it was fully average. In Sind the year was, agriculturally, far below the normal, owing to the late rise and early fall of the river.

The prices of agricultural produce were almost stationary for the staple food products, but the other marketed crops (especially cotton which is the main money crop of the Bombay Presidency) showed a tendency to fall. The price of cotton was, on the whole, over 24 per cent. below the average of the preceding five years, and over 28 per cent. below the price

of the last year. These falls in price, combined with the poor season, mean that the farming classes have not had a prosperous year.

AGRICULTURAL IMPROVEMENTS IN COURSE OF STUDY AND INTRODUCTION

In my last report I considered in detail the main items of agricultural improvement which have been worked out and are being pushed by the Department of Agriculture. There is no need to repeat this, and I may confine my attention this year to the progress made with these and other items during the year under report.

Groundnut Cultivation.—The increase in the area under groundnut cultivation as a result of the general availability of the short period, high oil-bearing types of groundnut introduced originally by the Agricultural Department from Japan and the United States continues to be very remarkable. The actual area again advanced greatly in 1925-26 as the following figures will show —

Groundnut Area

	Khandesh	Upper Gujarat
	Acres	Acres
1912-13	4,119	395
1924-25	140,190	39,151
1925-26	297,211	75,875

with declining prices for cotton this increase is likely to be continued ; but with the success of these crops the temptation to mix the high quality crops now grown with larger yielding but inferior types is great, and during the year complaints have been considerable. Every effort is being made to convince the growers of the crop of the necessity of *only* growing pure seed of the known types, but the present danger is great, and it would seem, especially in Khandesh and Upper Gujarat, that all Government departments interested should combine to do everything in their power to prevent the introduction of inferior types.

Wheat.—In my last year's report, I noted that Pusa 12 wheat had become the standard type of wheat in Upper Sind, at least under irrigation, though there was still doubt about its value for *bosi* conditions. Evidence is now increasing that it is far superior to the local wheats even for *bosi* cultivation, but for irrigation two strains of local wheat have now been evolved which are doing much better even than Pusa 12. These wheats which have been tested both at Larkana and Sukkur are known

as Phundani C. P. H. 27, and Thori A. T. 38 have given respectively an average increased yield over Pusa 12 of 13½ per cent. and of 8¾ per cent., and are now being multiplied for spreading on a large scale. With an efficient organisation, in the form of Taluka Development Associations for spreading new types of seed like this their extension will now be rapid. The suitability of Pusa 12 for *bosi* conditions seems now proved, in spite of the prejudice against it.

In the Deccan and Karnatak, three definite pure strains of wheat have now for a series of years given consistently high yields, standing above Pusa 4, the standard type, and are now being multiplied. Their only disadvantage is a slight lateness as compared with the Pusa types, which lays them open to a certain extent to rust attack. But whether they are tested at Poona, Jalgaon or Dharwar, we appear, definitely, this year to have got to the stage when wide distribution of these types can be taken in hand as soon as a sufficient quantity of seed is available.

Cotton.—Cotton is one of the chief products of the Bombay Presidency, and its improvement has always been one of the chief interests of the Bombay Department of Agriculture.

Taking Sind first, I may note the general and increasing adoption of American cotton (of the Punjab types F.4 and F.285) in the Jamrao area, where alone these are suitable under existing water conditions. These are high yielding, but the Cotton Breeder in Sind has succeeded in isolating still higher yielding strains from the general Punjab stock. These Punjab American cottons are being multiplied as fast as conditions allow, and very shortly Sind will be quite self-dependent in the matter of American cotton seed.

Cotton seed directly imported from America have again given us excellent cotton, in the case of varieties known as "Durango," "Hartsville," and "D. T. Webber," but the yield is so low compared with the Punjab types that they seem to have little future. Crosses have been made between some of the very high staple American strains and the Punjab types, and it is hoped that, from these, high yielding strains of long staple may be isolated. With the opening of the Sakrand Agricultural station, with an assured water supply earlier in the seasons further efforts with the best American types and with several Egyptian cottons are being undertaken in 1926-27.

In Gujarat the advances already made have been brought into more general use in the Broach cotton area, and another,

distinct step forward has been achieved. Half a million acres, at least, are now under the improved type (1027 ALF) chiefly in the Surat District and the adjoining areas in the Baroda, Rajpipla, Sachin and other States. In the year under report the Chota Udaipur State has decided to aim at the exclusive growth of this cotton, and we are supplying seed to it for the purpose. As before, the Agricultural Department makes itself responsible for the supply of seed each year for 100,000 acres.

The seed, 1027 ALF, which has been such a great success south of the Narbada, has not penetrated north of that river, where owing to its low ginning percentage as against the local (largely *Goghari*) cotton, it has proved less profitable. We have now definitely got a new strain by crossing, now breeding true, which will be suitable for this area. This, which is known as " Broach 1A. 9 " has 3·7 per cent. more ginning outturn and nearly one-eighth of an inch more staple than the Broach local cotton, and is now being multiplied. I anticipate that it will create as big a revolution in the Broach area, as has been caused south of the Narbada by the seed " 1027 ALF ".

In Upper Gujarat, where *wagad* cotton is grown (the Dholleras area) two strains have now been sufficiently tested for general multiplication, and 150 to 200 acres of these are being grown in 1926-27.

In Khandesh, after four or five years intensive work, two pure strains of improved cotton, now termed Dhulia Numbers 1 and 2 respectively, are being definitely multiplied for distribution. Hitherto, we have had nothing better to offer to the people than the well known N. R. Cotton, which while high yielding and possessing a high ginning percentage, was poor in point of quality and spinning value. For this, however, there is a big demand, exploited as far as possible by means of Taluka Development Associations, Co-operative Sale Societies, and the Dhulia Branch of the Central Co-operative Bank. The question has been, however, of obtaining a *better* cotton, and this has now been achieved. One of the two types above mentioned has proved itself on large scale cultivation, and is being given out for multiplication in 1926: the other is being proved on a large scale in the present season.

In the Karnatak.—Here the demand for the Dharwar No. 1 cotton (a Kumpta selection) of the Agricultural Department has exceeded all bounds. The Hubli Co-operative Cotton Sale Society which has undertaken its large sale multiplication and which distributes each year seed for over 100,000 acres is now

anxious to multiply its activities many times over, and, as I write, a scheme is being considered under which the Agricultural Department is asked to increase its breeding area and its primary multiplication area to a very great extent. Further, the cross made by Mr. G. L. Kottur, which with practically the same staple gives a better coloured cotton and a much higher ginning percentage, is now being multiplied and spread on a large scale at Gokak for distribution from that centre.

The demand for the improved American Upland cotton (Gadag No. 1) of the Agricultural Department has equally exceeded all our capacity to supply. The Gadag Co-operative Cotton Sale Society, which has undertaken its large scale multiplication, and to which we distribute each year seed for 5,000 acres, for multiplication has been demanding more, and arrangements have been made to increase the supply from 1927 to seed for 7,500 acres. Difficulties have arisen in the Gadag market in 1925-26 in connection with the marketing of this cotton to which I need not refer here, but everybody wants it, and the seed does not by any means fill the demand.

Another very interesting piece of work here is the improvement of the Gadag No. 1 cotton (Upland American) by crossing with Sea Island cotton. The cross has reached the fourth generation, and two strains of great promise have been obtained.

Rice.—The work in the North Konkan on the improvement of Kolamba rice has now become popular. The type which we are spreading (Kolamba No. 42) is now in demand. We are able to give out seed for 10,000 acres each year, changing the distribution area each year, and leaving it thereafter to push itself. As it gives 20 per cent. increase in yield on the usual types grown, this is enough to secure demand when once it is known. 1925-26 was the second year of such distribution. At Karjat, where the above rice was evolved, a second type has been produced (Kolamba No. 79) which is proving a great success in the South Konkan at Ratnagiri, and is being multiplied for wide distribution there.

The station at Karjat (along with that at Kumpta) has also given valuable results regarding the best way of increasing yield with rice apart from the evolving of better types. These have proved the efficiency and profitableness of Sulphate of Ammonia as (1) a very satisfactory substitute for *rab* treatment on the seed beds and (2) a very profitable fertiliser in the transplanted crop up at least to 100 pounds of fertiliser (20 lbs. nitrogen) per acre. Its use in both these directions is now

being pushed, not only near Karjat, but very much more widely. In the Kanara rice soils, however, far better results are being obtained with bone meal (which seems useless near Karjat), and very remarkable results continue to be obtained with it, except in ill-drained, water logged, low lying land.

Rice is also being bred at Ratnagiri where the year under report was the third of this work. Pure types of early rices, giving high yields, up to 35 per cent. above that of the local rices, have been isolated and are being multiplied. In the late rices, the question of the rice borer (*Schoenobius bipunctifer*) seems to be the dominating consideration, and some types have been isolated which with good yield, show marked resistance to borer. It must be realised that this work is at its beginning.

In the rice area above the Western Ghats, a station for the production of improved high yielding rice types suited for that tract, and for studying the problem of wild rice (Gonag) is maintained. As a result of three years' work, a number of strains of both the *Mugad* and the *Antarsal* varieties have been given out for trial on a field scale.

But, so far as rice is concerned, progress has been nowhere greater than in Upper Sind, where rice selection has been going on for some years at Larkana. In *Kangani* rice strains have been isolated giving from 19 to 31 per cent. greater yield than the local types of the rice, and very similar results have been reached with other varieties (Jajai and Bong). The demand for our seeds has grown very keen as a result of their trial by a few zamindars. As yet only 200 maunds are available, but the necessary organisation for seed multiplication is being developed.

Tobacco.—One of the greatest of recent success has been the rapid extension of the use of the tobacco strain (Gandiu No. 6) isolated in Upper Gujarat at the Nadiad station. I spoke last year of its isolation ; it has now proved itself and the demand is far in excess of anything we can supply. Two bulletins have been recently issued on tobacco improvement in North Gujarat giving information regarding the above strain. The results of the latest experiments on tobacco manuring which afford a practicable and profitable method of treating tobacco, and the results of recent successful experiments on the methods of treating inferior and bad patches in tobacco fields. The material in these bulletins are now the central feature of our propaganda among the tobacco growers of the Kaira District.

Jowar.—This is our premier cereal crop, occupying over 8,000,000 acres each year. Efforts to improve the yield of varieties in cultivation are in progress at Dharwar, Surat and Larkana (in Sind). In Dharwar, as the result of five years' work, we have improved seed to distribute in the transition tract capable of giving from 12 to 24 per cent. increased yield. The multiplication of these is now being taken vigorously in hand. At Surat, the seed of our selection entitled "*Althan-deshi*" is now being multiplied and distributed, as it has given from 147 to 230 lbs. of *jowar* grain per acre more than the local types. The work in Larkana (Sind) has advanced so far that five types of *Jowar* seed have been given out for multiplication.

The above work all refers to Kharif *jowar :* in the case of *rabi jowar* work has only been undertaken at Broach, but here six promising strains are being tried on a large scale. The study and improvement of *rabi Jowar* in the great *jowar* producing regions of the Bombay Presidency (Sholapur and Bijapur) is an urgent need which we have not so far had the staff to undertake.

Nachani (*Eleusine Corocana*) or *ragi.*—The great food millet of the upland areas in the heavy rainfall regions, is being studied at Hatkamba near Ratnagiri. In my last year's report, I said I hoped to be able to announce that certain types isolated have stood the test of cultivation on a considerable scale. This is the case in the strain known as "E-31" which has consistently given an increase of 33 per cent. in yield. This is now to be multiplied on a field scale for distribution.

Thus far the investigations into crops which are financed from the ordinary budget of the Agricultural Department, other schemes for the improvement of crops have been financed again by the Indian Central Cotton Committee, and by the Sir Sassoon David Trustees, and the progress during the year with these is recorded below.

1. *Study of Cotton Boll Shedding at Surat.*—This work has now been in progress for three years, and the grants of Rs. 25,000 for it has been renewed for a further period of two years. It is an attempt to find out the reason for the enormous loss of buds and bolls formed on the cotton plant, for usually less than 20 per cent. of the flower buds formed ultimately produce bolls. A full review of the position has recently been made at the end of three years' work, and two lines of advance seem to afford promise of success in reducing the loss. One of these lies in the development of strains of cotton with a small loss of buds and bolls. The other lies in regulation of the moisture

content of the soil and sub-soil in the latter part of the season. The position is distinctly promising.

2. *Study of the spotted Boll Worm of Cotton at Surat.*— This work has also been in progress for three years and the grant of Rs. 15,000 a year for it has been renewed for a further period of two years. It is an attempt, by a close study of the habits and enemies of the spotted boll-worm, to see how it can best be checked. In the first two years, the encouragement of parasites seemed a likely line of work, but there seem less possibilities in this direction than these appeared to be a year ago. But, on the other hand, the destruction of *pupae* in the soil where they are found seems to have much more possibility than there appeared to be the case. The problem is a very difficult one, but the annual loss is so great as to justify very great effort.

3. *Study of Cotton wilt and of American Cotton at Dharwar.*— The investigation of the Cotton wilt disease is a matter of very great importance and a grant of Rs. 25,000 a year has been made by the Indian Central Cotton Committee for this purpose, which has been recently renewed for a further period of two years. To this has been added the study of American Cotton at Dharwar.

In connection with the former matter, it seems pretty certain that we have succeeded in breeding a type of Kumta Cotton, which has all the desirable qualities of the best strains, but is also immune to wilt disease, and that this is *one* method of solving the wilt problem seems now to be proved. Other lines of attack are not yielding such clear results, but are being proceeded with.

As regards the improvement of American Cotton at Dharwar the matter has been already referred to above. We have now the fourth generation of a selection from a cross of Gadag No. 1 Cotton (Upland American) and Sea Island Cotton which is high yielding, resistant to red leaf blight, and of course, with better staple. I am inclined to think that it is *the* cotton of the future in the Gadag area.

4. *Study of the Physiology of the Cotton Plant under Irrigation in Sind.*—A grant has been made by the Indian Central Cotton Committee, amounting to Rs. 20,000 a year for three years, for the physiological inquiry into the behaviour of the Cotton plant under irrigation in Sind, but it has not been possible to take it in hand yet. This has been primarily because the Sakrand Station where alone the work can be done with the laboratory, has not been ready and partly owing to the difficulty of finding

a suitable man to undertake the work. It is expected that a start will be made in the current year, and that an account of the lines of work can be given in next year's report.

5. *The improvement of Grass Lands.*—The Sir Sassoon David Trustees have now made a grant for several years for the study of grass lands in Western India, with a view to their improvement, and Rs. 5,000 was received for this purpose in the year under report. The investigation has now proceeded so far as to enable us to take charge of a large area for improvement by rotational grazing, and it appears likely that the method will have a very wide application. During the year a Memoir resulting from this work entitled "A Study of some Indian Grasses and Grass lands" has been published by the Imperial Department of Agriculture, on our account, and is available.

6. *The Improvement of the Bajri Crop.—Bajri* is the second most extensive cereal crop in the Bombay Presidency, and a study of its improvement has for some years been financed by the Sir Sassoon David Trustees. In 1925-26, a grant of Rs. 6,667 was received on this account. Though progress is being made. the improvement of this crop has been found a matter of peculiar difficulty. But we have now a number of high yielding strains in hand, equally drought resistant with the bulk of the seed grown. These need further testing before multiplication can be attempted for distribution.

7. *The checking of the Jowar Stem Borer.*—This is another investigation financed by the Sir Sassoon David Trustees and Rs. 4,668 have been received during the year under report. The work is developing on the lines indicated in last year's report,—of encouraging the ploughing up of stubbles as soon as the previous crop is reaped, and exposing the Kadbi (where the insects hibernate) to the full glare of the sun before stacking.

8. *The Improvement of the Mango Crop.*—During the year under report work has been commenced on the study of the mango flower blight, which causes an annual loss of from twenty to eighty per cent. of the crop, under a subsidy of Rs. 5,000 from the Sir Sassoon David Trustees. The work has been well started under the charge of Mr. P. V. Wagle, M.Ag., at Ratnagiri, and, in spite of 1926 being one of the worst years on record for mangoes, good progress has been made. I hope to be able to present definite results next year.

There are investigations on crops alone which are partially or wholly financed by outside bodies. There are inquiries to be

referred to later on other matters which have been also financed by the Indian Central Cotton Committee and by the Sir Sassoon David Trustees.

During the year under report there have been

1. Indian Central Cotton Committee—

(*a*) The finance of the Cotton Crop in Khandesh (Rs. 5,000).

(*b*) The finance of the Cotton Crop in the Dholleras region (Rs. 5,000).

2. Sir Sassoon David Trustees—

(*a*) The Economic Efficiency of Agricultural Implements (Rs. 5,000).

The whole of the work for which we are so indebted to these bodies could hardly have been undertaken in the absence of these subsidies. I think the thanks of Government are due to the bodies in question for the very large assistance they have given in all the directions noted.

Improvements on Tillage and on Implements.—The Agricultural Engineer attached to the Department of Agriculture has devoted a good deal of time in the year under report to devising modifications of Agricultural implements, suited for Bombay conditions. Five of these have been perfected during the year, and a detailed account of these will be found in the report of the Agricultural Engineer attached to the present report. The modifications relate to (1) the Orient plough in use in Sind by which the cost can be reduced from Rs. 38-8-0 to Rs. 20 without any sacrifice of efficiency. It has been tried extensively, with success, both in Sind and at Manjri Farm, (2) a seed drill, suitable to country use, capable of being made locally out of locally available material, (3) a removable point for the ploughshare of the C. T. 2 plough (the most common size used in the Deccan black soil) made of a special alloy which resists the wear which so reduces the life of ploughs when ploughing dry soils, (4) a cheaper winnowing machine than any on the market. All these are now ready, and arrangements for manufacture are being made. No. (1) above (the modified Orient Plough) can be and is being made by blacksmiths in Sind. In this matter of making implements, I may again note the very hearty co-operation which is being given by Messrs. Kirloskar Bros. of Kirloskarwadi, and the Satara Industrial Works at Satara Road, in the development of agricultural implements. It is arranged that the Agricultural Engineer should devote more time to the improvement of agrricultural

implements in the future than has been done in the past, and I expect a very much larger output in this direction.

I have already referred to the grant made from the Sir Sassoon David Trust Fund for researches on the economic efficiency of agricultural implements. This work for which Rs. 5,000 have been received from the Trustees in the year under report, is resolving itself into a study, in the first instance, of the character of cultivation which under the semi-arid conditions of the Deccan will give the best results in crop production. This stage which is essential in a fundamental study of the economics of agricultural implements is now in hand, and when results have been obtained the power of various implements to provide cultivation of this character, in the most economical way will be tested. I hope to have very definite results to report next year.

During the year there has been a very considerable development of the use of motor tractors more particularly in Gujarat. The types used have been chiefly three,—the " International ", the " John Dare " and the " Case ", and they have been largely in the hands of contractors who, besides cultivating their own land if they have any, have worked their machines for other landowners. The foul condition of the land which, in the heavy soil conditions, was almost impossible to remedy, has led to these tractors being used for very much deep ploughing for which heavy fees have been paid. Further, they have been used for preparing land for ridge cultivation on a considerable scale, and have many advantages for this purpose. In other areas, there is a very widespread demand for tractors for cultivation, and a few have been purchased by larger and more progressive landowners. If tractors were available in Khandesh, in the Eastern Deccan, and in Dharwar at least, they would be used, and I have made proposals to Government by which tractors will be available in two at least of our districts in the next year,—namely, Khandesh and Dharwar.

In Upper Sind, too, there is a demand for the same kind of work, and as a result of the *Cletrac* tractor on the Jacobabad farm, large zemindars are taking up this matter.

Cultivation under Drought conditions.—The consideration of the question of tillage leads me to speak of the progress made in making crops more secure in the very precarious areas which are the homes of famine. The most likely method of achieving this end (apart from the use of special drought resisting crops and varieties of crops) is the development of the socalled " dry farming " methods, as specially adapted to the conditions of

Western India, and especially of the Deccan. Very striking results have been obtained by the Soil Physicist in several ways. In a year of fair rainfall, the application of green manure (*sann* hemp) has resulted in very largely increased yields of *jowar* owing probably to the increased relative power of the soil. In years of poor rainfall, like 1925, better results were obtained by trenching the land on the lines where the crop is to be planted and filling the trenches with loose soil. This, with the necessary concomitant of wide planting ensured a substantial crop in the *rabi* season of 1925, when surrounding crops of the cultivators were lost altogether. We are now considering exactly the form our recommendations should take, but the material is in hand for widespread demonstration.

Ridge Cultivation.—The consideration of this tillage naturally brings me to note the rapid extension of the newly introduced method of ridge cultivation in Lower Gujarat. This method, designed to deal with the very great chances of waterlogging in the early part of the season, has now extended into new areas, and about 100 acres were put under it as a demonstration, in the Olpad taluka of the Surat district to which it seems particularly applicable. In a very few years I expect that it will become general in the black soil areas of Lower Gujarat, and that the result, on the average, will be an increase of crop of from twenty to twenty-five per cent.

Manuring.—I need hardly refer to the extension of certain artificial manures in recent years as a result, largely, of the work of the Agricultural Department,—as the use of Sulphate of Ammonia for sugarcane, and of Castor Cake for cotton in Khandesh have now almost become matter of general practice. Some other manurial treatments, though proved successful are still demanding very widespread demonstration. As I noted in my last year's report, the extension of the use of artificial manures is a slow business when one is dealing with peasant cultivators.

In this direction we are now concentrating on the following, whose utility seems proved :—

(*a*) the use of Sulphate of Ammonia on the seedbeds of rice both in the North Konkan, and in the ghat tracts,—as a substitute for *rab* treatment.

(*b*) the use of Sulphate of Ammonia as a field manure for transplanted rice in the North Konkan, at the rate of 100 pounds of the fertiliser per acre.

(*c*) The use of bone meal as a field manure for rice in the red soil areas of the South Konkan and Kanara and particularly of the latter.

(*d*) The use of nitrate of soda as a manure for onions in the Nasik District.

(*e*) The extension of rapid acting manures for cotton in Khandesh. These consist of mixtures of oilcake and sulphate of ammonia.

(*f*) The use of artificial manures for tobacco in the Kaira District.

We are frequently approached by bodies representing large commercial interest in certain artificial fertilisers to make tests on their behalf, under our condition, and we are very pleased to be able to do so, in case they prove to be of special value. Thus we have in recent years arranged among others, for experiments with nitrate of soda, with calcium cyanamide, with "ammo-phos" (phosphate of ammonia), with "radio-phos" (a finely ground rock phosphate), and with phenania phosphate. So far the really successful materials have been sulphate of ammonia (very widely), and nitrate of soda (in a number of cases), while the others are still in the stage of trial.

Checking pests and diseases.—I may now make a few notes on the advance made in dealing with the chief agricultural pests and diseases, but will only refer to a very few of these.

(*a*) *Crabs as an agricultural pest.*—The very large amount of damage done in the Konkan and to a certain extent in the Ghat regions, by crabs as pests of the rice crop is well known. They destroy the embankments, and so liberate the water in the rice fields, and further they feed on and destroy the young rice seedlings on a wholesale scale. The study of the habits of the crabs which are guilty has now gone on for several years, and is now sufficiently elucidated (*vide* Bulletin No. 118 of the Agricultural Department) to make it possible to attempt practical methods of control. These have gradually reduced themselves to the possibility of fumigating the rat burrows. That this can be done quite effectively by means of carbon bisulphide, and also (as discovered in the present year) by calcium cyanide is now quite clear. The question is now simply one of cost, and I hope that in the current season we shall be able finally to design a method of carrying out the work at a cost justifiable by the very great loss now suffered.

(*b*) *Rats as an agricultural pest in Sind.*—If crabs are a serious pest of rice in the Konkan, rats are a far more serious pest in Lower Sind, and an inquiry was instituted in 1924 into the

nature of the rat to which the chief damage is due, and its life history so that a reasonable method of control could be devised. This has resulted in the discovery that the Sind mole rat (*Gunomys sindicus*) is the chief offender, and that it can be dealt with by fumigation of the burrows with carbon bisulphide at certain times of the year only, namely, from July to October. The treatment will cost only Re. 1 to Rs. 1-4-0 per acre, and a demonstration on an area of five square miles is being undertaken in the current season. I may draw attention to the very capable way in which the study of this pest has been carried out by Mr. P. V. Wagle.

(*c*) *The "Katra" caterpillar of the Upper Gujarat.*—For several years we have been studying the very serious damage annually caused in Upper Gujarat, and especially in the Panch Mahals by the swarming caterpillar known as '*Katra*' (*Amsacta moorei*). This study has finally resulted in the working out of two methods of control, namely, by dusting the crops in the early stages with Paris Green mixed with gram flour in the proportion of 1 in 20, or by using baits of *mhowra* flowers mixed with Paris Green. Both seem effective and practicable and both are being tried on a large scale in the current season.

(*d*) *Mango flower blight.*—The investigation recently undertaken on this very serious hindrance to the development of the mango industry, has been referred to in a previous paragraph as one of the inquiries financed by the Sir Sassoon David Trustees.

There are a number of other pests and blights under study but the results are not in such a condition to need mention here.

Live stock improvement.—The work of the Agricultural Department in the direction of cattle improvement consists in the maintenance of herds of cattle of high quality at Karachi, (Red Karachi breed, with some Thar and Parkar cattle), at Chharodi in Upper Gujarat and at Surat (Kankrej breed) and at Bankapur in Dharwar (Amrit Mahal breed)—in assisting other bodies to maintain high class herds of cattle and in putting out premium bulls among the villages of the Bombay Presidency.

As regards the work on the cattle farms belonging to the Department, I may refer to the manifest improvement in the stock at each of them. At Chharodi, the oldest and largest farm designed for the Kankrej breed, stress is being laid on trueness to type, early maturity, regularity in calving, and

increase in the milking capacity of the animals without interfering with the drought qualities of the breed. The standard of milk yield is improving (milking was only started in 1920), and the animals are maturing much earlier, the average age of the first calf having been reduced by nine months since 1921-22. Seven premium bulls were put out from this farm in the year under report. Ten premium bulls of the Kankrej type were distributed from the Surat herd. At Karachi, where the herd is essentially composed of cattle of the Red Karachi breed, renowned for its milking qualities, we have now perhaps the finest herd in Sind. There are now two cows giving over 8,500 lbs.,two giving over 6,500 lbs.,and nine giving over 5,000 lbs., per lactation. This is in addition to the amount taken by the calf, since here all calves are suckled by the mother. The following may be quoted from the report of the Live Stock Expert with regard to this farm :—" The farm is now working on four families or strains of cows, each of which has reached the 6,000 lbs., of milk yield work. One family has milking capacity, one family has size, one family has good udder development, and the fourth is a low-set small animal. Some of these have soft hoofs, others have hard hoofs, and by breeding and selecting between these families, an ideal animal should be produced. The herd, especially the young stock, are now getting more uniform in colour and conformation, and it is doubtful if a herd equal to this exists in India. "

I might refer here also to the very excellent herds of Sindhi cattle and Surat buffaloes at the Agricultural College, Poona. These are maintained primarily for teaching purposes, but advantage has been taken to breed cattle of high class milking capacity. After making allowance for the cost of teaching, the College Dairy now pays very well.

Live stock improvement is also carried out in co-operation with certain public bodies, notably with the Bombay Gowrakshans at Kandivli and at Mulund. At the former the Gowrakshan authorities are maintaining, in co-operation with Government, a herd of pure bred " Gir " bulls. The farm started two years ago with forty herd of as pure Gir cows as were available, with two bulls. Today the herd has 92 head of live stock, with 14 young bulls now nearly ready for issue as premium bulls. The yield of milk per cow is rapidly increasing.

As regards premium bulls, there are now 168 of these out in the districts, and they are doing exceedingly good work. They consist of bulls of pedigree stock from our farms or associated

institutions, or of the best quality obtainable where farm animals are not available put out in villages where they stand to serve the surrounding cattle. A record of service is kept and the support of the bull is paid for, at least partially, by Government. The effect of such premium bulls on the cattle of an area is remarkable, and is so obvious that the demand for premium bulls is rapidly increasing. It is being illustrated in a striking manner in the Presidency Agricultural Show in Poona in 1926.

I have not hitherto referred to the very successful experiments in the improvement of Deccan sheep by the use of three quarter bred merino rams from Hissar. These are being carried out by Rao Saheb S. S. Mangsuli at Athni in the Belgaum District in co-operation with the Agricultural Department, the rams being provided by us. The result has been very substantial, including very great increase in the weight and character of the fleece, and in the size of the sheep. The rams from the Punjab are not hardy enough to stand the Deccan conditions and several have died, but the progeny seem healthy enough. I hope to report fully on this work next year.

Poultry improvement.—During the year under report a very important beginning was made with systematic development of poultry in the Bombay Presidency. For this purpose it was felt that a central poultry farm of real pedigree fowls was the first essential, and this has been established at the Agricultural College in Poona, with pedigree stock of Leghorns and Anstral-larks. When these multiply, the stock will be sent to other centres, using the vernacular agricultural schools for the purpose and the cockerels produced finally distributed on the understanding that other cocks are excluded from the flock of fowls kept by the man to whom the cockerels are distributed. A report on the progress in working out this scheme will be made next year. In the meantime, evidence of the increasing interest in poultry is afforded by the establishment of a Bombay Presidency Poultry Association. Further, an investigation of the marketing of eggs has been undertaken by the Central Co-operative Institute in co-operation with the Agricultural Department.

Fodder crops and fodder.—Closely connected with live stock improvement is the question of the provision of fodder, and a good deal of attention has been given in recent years to the study of fodder crops, and several new ones have been discovered and introduced. Attention may be called to the possibilities of *Shevri* (Sesbania aegyptiaca) as a regularly cultivated fodder

crop, giving repeated cuttings almost like lucerne, and capable of growing on land considerably affected by Salt, provided irrigation is available. A bulletin (No. 115) has been issued on this crop. More recently very successful experiments have been made with Elephant Grass also known as Napier's Fodder Grass (Pennisetum Purpureum), and this has proved itself as a high yielding fodder grass in Poona, at Chharodi, and near Karachi. It grows well under sewage effluent, and has given as much as 125,000 lbs. of green fodder per annum under these conditions. The Live Stock Expert speaks of it as " A wonderful perennial fodder " from his experience near Karachi, where it is spreading out into the District. A bulletin has recently been issued on the grass (No. 127) other valuable fodders are being tried and Kikuyu grass seems to have possibilities under irrigation near Karachi, and Para grass at Kandivli near Bombay.

The use of silage for fodder has hitherto made little progress, though there are a number of silos in various parts of the country which are regularly filled. We have now definitely, after much hesitation and experiment committed ourselves to recommending the use of *Kutcha* pit silos, which does not require capital outlay. This has been endorsed since the decision was made, by the Indian Board of Agriculture at Pusa in January 1926. A bulletin (No. 120) by Mr. E. J. Bruen, has recently been issued on this subject, embodying the latest methods. I expect a rapid extension of silage making in the near future.

Sind Experimental Scheme.—At this point I may refer to the scheme, sanctioned near the end of 1925, for undertaking an extensive series of experiments at Sakrand in Central Sind, and elsewhere in Sind, on the methods of using the water which will be made available when the Sukkur barrage and connected canals are complete. The main experimental station has been established at a point, where owing to the supply of water being now available, the conditions after the completion of the Barrage can be now imitated, and the best part of the year 1925-26 has been employed in getting the area, previously in jungle, into a condition for cultivation, in establishing the necessary pumps and the canalisation of the area, and in providing the necessary laboratory and other accommodation. About seventy acres will be under cultivation in 1926-27. There are three main sections of the experimental work,—namely (1) to determine the crops which can be most profitably grown under the barrage conditions in Central Sind, and to breed, if necessary, types of these crops suitable to the conditions,

(2) to find the best way of using the water which will become available, under the conditions of Soil and climate prevailing in Central Sind, and (3) to find the way in which the supply of perennial water will affect the Soil in the completely arid, semi-deltare conditions of Sind. I have undertaken personal responsibility for this work, and an extensive report on the first year's actual cultivation will be submitted in 1927.

PROPAGANDA AND ORGANISATION

As I stated last year, the discovery of improvements is a very small step in the greater part of Western India, to getting them introduced. The much larger step of bringing them to the knowledge of the people is being undertaken by district overseers of whom there are an average of two per district, working under the control of a corps of six deputy directors of agriculture, by certain officers of the Co-operative Department, termed agricultural organisers, who have done similar duties but with special stress laid on the organisation of the population for agricultural purposes into co-operative societies, and by the officers of the Revenue Department whose assistance in the introduction of certain agricultural improvements has been of very great value.

The above are official agencies. I, myself, believe, however, that unless we can get non-official agencies to co-operate and to work with energy for agricultural improvement, progress will be very slow. Hence I have welcomed the very hearty co-operation of Taluka Development Associations, of Co-operative Societies of every sort, of Agricultural associations such as the Dharwar District Agricultural Association, and now of District Local Boards.

The Taluka Development Association movement has made considerable progress during the year under report. A year ago there were forty-eight such associations in existence; now there are fifty-nine, distributed as follows :—

Gujarat Division	3
Khandesh and Nasik Division	14
South Central Division (Poona, Ahmednagar, Satara and Sholapur)	8
Southern Division (Bijapur, Dharwar and Belgaum)	11
Konkan Division	9
Sind	14
Total ..	59

Out of this number, fifty-five have been registered under the Co-operative Societies Act. Subsidies amounting to Rs. 23,627 were paid to these Associations in the year under report.

The lines of work which these Associations undertake has been similar to that in previous years. They have been very actively engaged in extending the use of improved implements of many kinds, and many of them have depots for the hire of implements. In Sind the Associations have in several cases organised the local manufacture and sale of some of the simpler implements like screw water lifts and Egyptian ploughs. They have also demonstrated the value and extended the use of improved seed, notably of cotton in many areas and of wheat in Sind. They have been active in checking diseases like smut in Jowar or *tambera* disease of potato, and the Sirsi Association in Kanara has been an agent in the extension of spraying against the *Koleroga* disease of betel palm. They have organized shows, some of which are noteworthy like that arranged by the Kambav Taluka Association (Sind) in the year under report. They have been the active agents in promoting the formation of non-credit co-operative societies. They have pushed small irrigation schemes as at Awasari Khurd in the Poona District. The Athni Association (Belgaum) has arranged an admirable system of fodder storage for the taluka. Some are planning cotton breeding schemes as in Bhusaval (East Khandesh). While the keenness with which these associations are run varies very much, and while the activity in many cases is not great, the remainder make up for the deficiency of the few. On the whole the Konkan Associations are the weakest though there are good ones among them,—and those in Khandesh and Nasik, and in Sind are the strongest. On the whole, these associations are becoming or have become a very essential part of agricultural propaganda in the country.

A recent development, which shows how these Associations are appealing to the leaders in the districts, is the proposal by the Satara District Local Board, to subsidise, to the extent of Rs. 500 per annum to each Association, taluka development associations in *all* the talukas of the district, subject to certain conditions. Since the end of the year under report these conditions have been accepted by Government experimentally for one year. This, however, is only a wider example of what is happening in very many cases,—for District Local Boards and Taluka Local Boards are both subsidising, to a limited extent, the Associations in their districts.

I may at this point refer to the work of the District Agricultural Association in Dharwar which has, with no subsidy whatever, acted as a central propaganda agency for many years in the Dharwar District. It now possesses a central building in Dharwar, acts a central hiring and sale agency for implements, has been a very useful agency for seed distribution, has controlled, in the early days of cotton improvement, an auction for the sale of improved cotton and groundnut, and has run a Kanarese agricultural magazine. It has led the way too in developing fruit cultivation near Dharwar. Recently I have arranged that one of the propaganda staff of the Agricultural Department should work through this Association and be at their disposal for a year. This Association, with its leader Mr. S. V. Desai, is to be congratulated on its many years of useful work.

In the matter of rural propaganda, the Agricultural Department works in close coordination with the Co-operative Department, as it is the recognized policy that wherever possible, any attempt to organise the rural community should be on co-operative lines. This co-ordination is secured by the existence of Divisional Boards of Agriculture, which are predominantly non-official and meet once a quarter and control the propaganda and organising work of both departments in the various districts.

The various fields of co-operative organisation in the districts, so far as their activities other than credit are concerned have developed to a very variable extent. The greatest success has been with co-operative sale, and to the previously recorded successes of the Co-operative Sale Societies for cotton in Hubli and Gadag in the South, and in Gujarat, together with *gul* sale societies in the Deccan, may now be added societies for the sale of chillies in the Karnatak and of betel nuts in Kanara. Again, implement hire societies are an established success in many places. Co-operative Supply Societies are still not extending to any great extent.

The Hubli and Gadag Co-operative Cotton Sale Societies have again been among the most valuable agencies in extending improved cotton seed in the Karnatak, as has been described in a previous section of this report. Considerable difficulties arose in the working of the latter society (Gadag) in the year, and I was afraid that its utility as a means of multiplying and distributing this cotton seed would be injured if not destroyed. Arrangements have, however, been concluded since the end of the year under report, by which I think it will continue to serve

as our agent for the multiplication and distribution of improved American cotton seed as hitherto.

Cotton Transport Act.—The working of the Cotton Transport Act during the year under report has been eventful, but there is now general satsisfaction, and it has without doubt prevented admixture of cotton in many areas.

In Gujarat, as the Co-operative Societies in the Olpad Taluka have agreed to sow the approved cotton seed of the Agricultural Department, the restriction as to transport of cotton *by road* over the country to the South of the Narbada river has been removed. The success of this policy of relaxation will depend, of course, on the very rapid elimination of inferior cottons all over this area, and I think I may say that this elimination is taking place, though not very rapidly. All the same, the demand for guaranteed seed is far greater than we can supply. Although we distributed nearly sixteen lakhs of pounds (actually 15,86,620) of seed in the year under report, demands were received for five lakhs of pounds more which could not be supplied.

In the Kumpta-Dharwar protected area, Government have given discretion to the Director of Agriculture to allow cotton from certain areas in the Muddebihal taluka (Bijapur) to go to Bagalkot market instead of to Bijapur. Otherwise, matters remain as before.

Rural Organization.—Very intense discussion has taken place during the year as to the steps which should be taken towards rural reconstruction, but little has been done. I would, however, reiterate that in attempting to consider the rural reconstruction required it is not one man or one department which is concerned. It involves the consolidation of holdings, the communal or co-operative holding of implements which are beyond the power of individual peasant cultivators, and the development of secondary occupations. It involves further the organisation of purchase of supplies and of sale of produce. It means the partial (and very possible) elimination of ill-health and malaria in the villages, and extension of education. The necessity is beginning to be realized, and this is the first step toward that reconstruction which is needed, as a compliment to the technical improvement with which I am more immediately concerned.

SERVICE

Apart from research and propaganda, there are certain services which the Agricultural Department performs for the agricultural

public, the chief being the supply of certain kinds of seed in large quantities, and of implements and manures in certain cases, the boring of wells and the designing of pumping plants, and, in recent years, the designing of land improvement works for construction by individuals or by co-operative societies.

Supply of Seed and Implements.—The supply of seed has been part of the work for the improvement of cotton in Surat, in the Southern Maratha Country, in Khandesh, and in Sind. In all these cases, seed is produced under the Department's own control for a limited area, and this is multiplied either by the Department itself or by a Co-operative Society with the assistance of the staff. The most elaborate organisation for cotton seed distribution is in Lower Gujarat, where in the year under report the quantity dealt with was 15,86,620 pounds of seed. This was all that was available in a year of short supply, but the demand was for 5,00,000 pounds more than this. It was distributed in the Surat, Broach, Ahmedabad and Panch Mahals districts, and large amounts were sent to the Rajpipla, Chota-Udepur and Mangrol States, while some went to Hubli. The actual multiplication and distribution of cotton seed in the Southern Maratha Country, beyond the amount needed to grow about 5,000 acres each of improved Kumpta cotton and of improved American cotton is in the hands of the Co-operative Cotton Sale Societies at Hubli and Gadag, respectively, and has been previously referred to. In Khandesh the original supply of pure N. R. Cotton Seed (amounting in 1925-26 to 25,000 lbs.) on the Dhulia and Jalgaon farms was distributed to taluka Development Associations, Co-operative Credit Societies, and the three branches of the Provincial Co-operative Bank at Shirpur, Dhulia and Parola as well as to certain individuals. These all arrange to multiply it, and then sell to their clients. In Sind, the Agricultural Department runs a small zamindari at Chellaro on the Jamrao Canal, essentially for the production of pure cotton seed of the best *deshi* type and where 1,75,680 pounds of seed were produced in 1925. Nearly double this amount is collected from our authorised seed growers, and also distributed. Beyond this point the further multiplication is in the hands of local bodies and individuals. The demand is far in excess of what we can supply.

In the North Konkan, we have undertaken the production and distribution of rice seed on a large scale, as we have guaranteed to give out improved seed for 10,000 acres each year, and this will be continued until we can get a co-operative organisation or a private person to undertake it.

In the tobacco region of the Kaira district, we are now planning to supply guaranteed tobacco seed of the Gandiu strain No. 6 for 1,000 acres each year.

Boring.—Boring for underground water is now recognised as a means in some areas of increasing the water available in wells, and in others as a means of finding water where the digging of wells is, under other circumstances, a very risky undertaking. The boring equipment of the Department was very largely increased during the year as a part of the schemes in hand for the prevention of famine. In 1925, orders were issued for the purchase of 16 power boring machines and for the conversion of practically the whole of the hand boring machines of the Agricultural Department, capable of going to a depth of 200 feet, to power. It was not possible, however, to complete all these conversions in the year. Further fifteen additional exploratory boring machines were obtained.

With the equipment in hand the following was the record of work, in summary, in the different divisions a detailed account of bores done under the control respectively of the Deputy Directors of Agriculture, and of the Agricultural Engineer is appended to each of their reports in accordance with Government orders. The work summarised here excludes that done with the machines lent to the District Local Board, Kaira, but includes all others :—

Division	Total bores	Successful bores	Unsuccessful bores	Bores in progress
1. Gujarat	62	35	21	6
2. North Central Division ..	10	1	6	3
3. South Central Division ..	54	23	28	3
4. Southern Division	39	31	5	3
5. Konkan	47	26	13	8
6. Sind	..	..	..	..
7. Famine Boring Scheme ..	78	49	24	5
Total ..	290	165	97	28

This shows a very large increase of bores made in the year under report, as would be expected when the boring equipment had been so much increased. The proportion of unsuccessful bores is almost exactly the same as in the previous year,—33·4 per cent. instead of 34·0 per cent. The largest percentage of failure occurred in the South Central Division and particularly in the Poona District where many failures were in drinking water wells made for the District Local Board.

Land Improvement.—The loss which annually occurs owing to the run-off, from the surface of the land, of the water which falls in the famine districts is very great indeed, and there have always been efforts by almost every energetic cultivator to prevent these losses, and to provide irrigation from tanks formed by such run-off water, or to embank valleys so as to increase the water in wells lying below the land, or to protect land by terraces or bunds across the surface. Technical skill is not always present, and to meet the need the Agricultural Department has employed two men.

The first of these is an engineer, styled the Land Development Officer, whose duty has been to prepare small schemes belonging to each of the above kinds. In the year under report, he has investigated forty-eight schemes classified as follows :—

(*a*) Diverting streams for irrigation purposes	14 schemes.
(*b*) Storing water by putting dams across *Nalas* for irrigation purposes ..	3 schemes.
(*c*) Percolation tanks (storing water for increasing well supply)	11 schemes.
(*d*) Field embankments for preventing run-off	13 schemes.
(*e*) Repairing irrigation tanks ..	2 schemes.
(*f*) *Diverting nalas* for land protection ..	4 schemes.
(*g*) Well designing	1 scheme.

The work done by the Land Development Officer has been much appreciated,—so much so, in fact, that the class of work which he was appointed two years ago to do has now been expanded, so far as the famine districts are concerned, and a separate department under a Superintending Engineer created to do it. As a result the appointment of Land Development Offieer, attached to the Agricultural Department has ceased to exist from June 1926, and Mr. N. C. Bapat who held the position has reverted to the Public Works Department. I must express, however, my appreciation of the very effective and efficient work he has done during the two years he has been with us, and a number of new works, undertaken to his designs, will remain as a sign of his activity as Land Development Officer.

The second type of man is what we have termed a " Bunding Officer." He is not an engineer, but what we may call an Agriculturist surveyor who devotes himself entirely to the preparation of schemes for field embankments or *tals*. Hitherto

we have had one such man, employed entirely in the Southern Division. The Schemes which he prepared were nearly all quite small, and for individuals rather than for communities, but his services are greatly in demand and highly appreciated. In 1925-26 he prepared sixty-seven schemes. Seventeen of these, costing Rs. 18,000 were prepared for landowners who were able to carry them out with their own capital, while the remaining fifty schemes (in the Bijapur District) depended on *tagai* loans.

This work has attracted much attention and has been so much appreciated that at the end of the year, Government sanctioned the appointment of two additional bunding Officers of the same class. One of these will also work in the Southern Division, and the other chiefly in the Deccan. In the precarious tracts no work can be of more value than this which assures the cultivators more value from the water which falls in rain than could otherwise be obtained, and prevents the erosion which often causes the loss of crop and soil at the same time.

Fodder Storage.—The Agricultural Department has been entrusted with the work of purchasing, shredding and baling, and storing *Jowar Kadbi*, on famine account, at Karajgi in the Dharwar District. This place was chosen on account of the fact that on a series of years it was the cheapest centre for the purchase of *Kadbi*, and the shredding and baling plant has now been in operation for two seasons. In the first year the machinery failed badly, probably because the *Kadbi* with which it had to deal being much thicker and stronger than that for which it was designed. In the year under report the knives were stiffened and as a result it was possible to shred, bale, and store 13,59,762 lbs., of *Kadbi*. This with the amount stored in the previous year makes a total store of a little over eighteen lakhs of pounds of fodder (18,03,520 lbs.). The cost of shredding and baling came to 6 annas 10 pies per finished bale of a little over 80 lbs.

Work against wild pigs.—The Control of this, one of the worst pests of our cultivated areas, both those adjoining forest areas, and those in the extensively cultivated canal tracts in the Deccan is carried on by three methods. The first is the encouragement of fencing of large areas by co-operative fencing societies formed for this purpose, and this method has led to the existence of a number of such societies particularly in the area bordering on the Kanara forests. The Societies so far formed use stone walls for fencing, and there are now ten such societies in existence. They have proved a great success, and

the land protected by the walls has already increased in value considerably. A number of other societies are in course of formation, but difficulties connected chiefly with the apportionment of cost, and with recalcitrant land-owners who refuse to enter in the scheme, make progress more slow than would otherwise be the case.

In the Deccan Canal areas and adjacent tracts, where there is not the reservoir of pig in the neighbourhood formed by the forests, we have adopted a system of pig-killing campaigns, with the hearty co-operation of the cultivators in the area in question. A special officer has been kept to direct these campaigns, and the work is paid for partly by the Agricultural Department and partly by the people themselves. Six campaigns were conducted during the year, and 273 pigs were killed. The work is very much appreciated by the cultivators, as a successful campaign removes the nuisance for a number of years to an extent which cannot be measured by the number of pigs actually killed.

AGRICULTURAL EDUCATION

Agricultural College.—The Poona Agricultural College has now entered upon its eighteenth year, and it is as popular as ever. This year (1926) there are 72 new students, 61 from the Bombay Presidency and 11 from outside, and this with 11 old students who rejoined after failure, made 83 in the first year class. This is quite as much as the College can deal with. The total number now on the roll of the College is 218. The demand for admission from all parts of India continues, but now we are limiting admission for students outside the Bombay Presidency to about ten per cent. of the total in the first year's class.

Rao Bahadur, P. C. Patil acted as Principal of the College from June 1st, 1925 until the return of Dr. Burns from leave, and again from April 4th, 1926 to the end of the year under report. Various other minor changes in the staff took place, details of which will be found in the Principal's report (see Appendix B).

The results of the University examinations in Agriculture were fairly good in the degree (B.Ag.) examination, where out of thirty-two candidates who appeared, twenty-five passes. In the Intermediate Examination the results were not nearly so satisfactory, though much better than last year. Out of seventy-seven candidates, fifty-six passes five being placed in the first class.

The year under report is the first during which the new University course has been in use, and on the whole it has been considered satisfactory, and an improvement on that which preceded it. Its introduction has necessitated the appointment of two additional demonstrators in the Agricultural Engineering section of the College, and of a demonstrator of Agricultural Economics.

Agricultural Schools.—The number of Vernacular Agricultural Schools working remains six as before. These are, as follows, with the number of students in each :—

	Loni (Poona)	47
Marathi	.. Jambul (Thana).. ..	25
	Dhula (West Khandesh) ..	29
Kanarese	... Devi-Hosur (Dharwar) ..	27
Gujarati	.. Godhra (Panch Mahals) ..	34
	Surat	29

It will be seen that in every case there is an increase on the previous years figures, the total for the six schools now amounting to 191 as against 169 a year previously or an increase of 13 per cent. The schools are all now practically full.

They remain popular, and all receive a certain amount of support from District Local Boards and some from private bodies. The boys leaving them are in demand, and either go to their own farms or are snapped up by others who need lands with such training as we can give.

Last year I mentioned that we had been approached by the Ahmednagar District Local Board to take over the buildings and a certain area of land at the Kopergaon Farm of the Agricultural Department as an Agricultural School to be conducted by the Local Board, and that Government had agreed to hand over the buildings and land for the purpose. I am sorry to say that the negotiations ultimately failed. During the year we have been approached to establish Vernacular Agricultural Schools after the Loni patterns in several districts, notably Kaira (Gujarat), Belgaum and Bijapur, and the matter in each case is under the consideration of Government.

Agricultural Bias Schools.—The new type of primary schools, with an Agricultural bias, first established in 1922 has been extended in the year under report, and from 1926 there will be 63 Schools of this type. We have a temporary arrangement by which we train teachers for these schools, doing the work at the Vernacular Agricultural Schools previously described. We, also, through the Inspector of Agricultural Schools, inspect

the technical work done in these schools. The results so far obtained seem satisfactory, the schools have become popular, and the number will be increased as fast as teachers are available properly trained to take charge of the classes.

STATISTICS

The Director of Agriculture is responsible for the Agriculture and price statistics published in the Bombay Presidency and for the forecasts of crops issued periodically during the year. With regard to forecasts, I may call attention to the recent increase in the number of these, the latest addition being that on the castor crop started in 1924 at the request of a number of comercial firms in Bombay.

During the year the work of compiling statistics of the cotton pressed in the Bombay Presidency was taken up by the Director of Agriculture under the provisions of the Cotton Ginning and Pressing Factories' Act. For the first time we have now a means of checking the accuracy of our forecasts of cotton production, and I am glad to say that in the Presidency proper, they stood the test very well. The figures for Sind were, however, unsatisfactory, being much below the actual production. I am in correspondence with the Commissioner in Sind as to how best to improve the data given in the Cotton Forecast for the future.

PUBLICATIONS

The following publications representative of the research activities, and in part, representative of the propaganda activities of the Agricultural Department have been issued during the year.

Memoirs

1. A study of some Indian Grasses and Grasslands by Dr. W. Burns, Mr. L. B. Kulkarni, and Mr. S. R. Godbole. Published by the Pusa Research Institute.

2. Nitrogen Recuperation in the Soils of the Bombay Deccan, Part I by Messrs. D. L. Sahasrabuddhe and J. A. Daji. Published by the Pusa Research Institute.

Bulletins

1. No. 122 .. .. Sugar Cane varieties of the Bombay Presidency by Mr. J. B. Knight.
2. No. 123 .. .. Ridge cultivation in Lower Gujarat by Rao Saheb B. M. Desai and Mr. K. B. Naik.

3. No. 124 .. The Chemical Composition of food Grains, vegetables and fruits of Western India by Mr. D. L. Sahasrabuddhe.
4. No. 126 .. The Bhagnari Breed of Cattle in Sind and Baluchistan by Mr. H. G. Baluch.
5. No. 127 .. Elephant Grass : A new and useful fodder crop in Western India by Dr. H. H. Mann.

Leaflets (with vernacular versions)

1. No. 1 of 1925 .. Use of wire for preventing the lodging of Sugarcane in the Konkan.
2. No. 2 of 1925 .. Hints to Sunn Hemp growers in the Panch Mahals.
3. No. 1 of 1926 .. Vernacular Agricultural School at Devi-Hosur.
4. No. 2 of 1926 .. Manuring of Sugarcane.
5. No. 3 of 1926 .. Preliminary Instructions in cultivation of Cotton on the Deccan Canals.

FINANCE

The expenditure of the Department amounted to Rs. 16,14,250 during the financial year 1925-26, as against Rs. 15,80,950 in the previous year. The receipts amounted to Rs. 3,09,180 as against Rs. 3,28,200 in the previous year.

As regards the Personal Ledger Account, which is used for financing seed, etc., the total amount advanced amounted to Rs. 1,75,545, while the recoveries credited during the year were Rs. 1,38,310.

Subsidies were received from the Indian Central Cotton Committee, for the pieces of work mentioned in the report, to the amount of Rs. 71,046. The expenditure against this amounted to Rs. 63,151 during the year.

We also received Rs. 34,335 during the year from the Sir Sassoon David Trustees.

ADMINISTRATION

I was in charge of the Department during the whole year. But from April 1926, when I took personal charge of the experimental work under the Sind Development Scheme, a temporary position of Joint Director of Agriculture has been created and has been filled by Dr. W. Burns. This has relieved me very considerably of the heavier part of the ordinary work of the Office of the Director of Agriculture. Dr. Burns'

position as Principal of the Poona Agricultural College has been filled by Rao Bahadur P. C. Patil.

During 1925 several of the senior officers of the Agricultural Department were on leave, notably Mr. E. J. Bruen, Live Stock Expert to Government, for whom Mr. H. G. Baluch officiated, and Dr. G. S. Cheema, Horticulturist to Government, whose place was taken by Mr. H. P. Paranjpye. In 1926 Mr. W. J. Jenkins, Deputy Director of Agriculture, N. C. D., has been lent to the Indian Central Cotton Committee, as Deputy Secretary of that body, and Mr. K. M. Pawar is officiating in his place.

During the year we have finally lost the services of Professor S. L. Ajrekar, Plant Pathologist to Government, whose services have been permanently transferred to the Educational Department. He has been connected with the Department and with the Agricultural College for many years.

The inauguration of the Sind Development Scheme necessitated the appointment of a special Economic Botanist for this work, and Mr. K. I. Thadani was appointed for the purpose from March 1926.

CONCLUSION

I commenced this report with a note of hopefulness. I must close it in the same strain. There is no doubt that the Agricultural Department *is* meeting the requirements of the Agricultural classes in an increasing measure each year, that its work is arousing continually more interest, and that its recommendations are more freely adopted. So long as the goal of its work is the advancement of the standard of life of the rural classes, and the increase in their prosperity, and, so long, as its work is efficient, so long, I feel, will it carry with it the support of the Agricultural interests,—and will be more and more potent factor in the progress of the country.

HAROLD H. MANN,
Director of Agriculture.

APPENDIX A

List of Taluka Development Associations organised up-to-date

According to the scheme laid down in Government Resolution No. 3378, dated 5th June 1922, Revenue Department, 59 Taluka Development Associations have been formed until now as shown below :—

Gujarat Division

Surat District	2
Ahmedabad District	1

Khandesh and Nasik Division

East Khandesh District	5
West do. do.	5
Nasik District	4

South Central Division

Poona District	2
Sholapur do.	3
Satara do.	3

Southern Division

Belgaum District	3
Bijapur do.	2
Dharwar do.	6

Konkan Division

Kanara District	2
Ratnagiri do.	3
Kolaba do.	1
Thana do.	3

Sind Division

Hyderabad District	4
Nawabshah do.	1
Larkana do.	2
Sukkur do.	3
Thar and Parkar do.	3
Karachi District	1

59

Out of the 59 Associations 11 were formed in the year 1922-23, 27 in the year 1923-24 and 10 in the year 1924-25 in the talukas mentioned below :—

Year		Taluka		District
1922-23	..	1. Chorashi	..	Surat.
,,	..	2. Pachora	..	East Khandesh.
,,	..	3. Jalgaon	..	Do.
,,	..	4. Madha	..	Sholapur.
,,	..	5. Satara	..	Satara.
,,	..	6. Khed	..	Poona.
,,	...	7. Dharwar	..	Dharwar.
,,	..	8. Ron	..	Do.
,,	..	9. Gadag	..	Do.
,,	..	10. Chikodi	..	Belgaum.
,,	..	11. Athani	..	Do.
1923-24	..	1. Bhusawal	..	East Khandesh.
,,	..	2. Raver	..	Do.
,,	..	3. Dhulia	..	West Khandesh.
,,	..	4. Nandurbar	..	Do.
,,	..	5. Nasik	..	Nasik.
,,	..	6. Kadwa Canal Development Association, Ojhar Tambat (Niphad Taluka).		Do.
,,	..	7. Satana	..	Do.
,,	..	8. Sholapur*	..	Sholapur.
,,	..	9. Walwa	..	Satara.
,,	..	10. Gokak	..	Belgaum.
,,	..	11. Indi	..	Bijapur.
,,	..	12. Mahim	..	Thana.
,,	..	13. Kalyan	..	Do.
,,	..	14. Alibag	..	Kolaba.
,,	..	15. Dapoli	..	Ratnagiri.
,,	..	16. Ratnagiri	..	Do.
,,	..	17. Rajapur	..	Do.
,,	..	18. Sirsi	..	Kanara.
,,	..	19. Karwar	..	Do.
,,	..	20. Hyderabad	..	Hyderabad, Sind.
,,	..	21. Hala	..	Do.
,,	..	22. Tando Allahyar	..	Do.
,,	..	23. Shahdadpur	..	Nawabshah
,,	..	24. Larkana	..	Larkana.
,,	..	25. Kambar	..	Do.
,,	..	26. Sukkur	..	Sukkur.
,,	..	27. Ghotki	..	Do.

* Ekruk Tank Bagayatdar Sangh.

Year	Taluka	District
1924-25	1. Edlabad	East Khandesh.
,,	2. Sindkheda	West Khandesh.
,,	3. Junnar	Poona.
,,	4. Karmala	Sholapur.
,,	5. Hirekerur (Kod Taluka).	Dharwar.
,,	6. Hangal	Do.
,,	7. Karachi	Karachi.
,,	8. Jamesabad	Thar and Parkar.
,,	9. Digri	Do.
,,	10. Mirpurkhas	Do.

The remaining eleven Associations have been formed during the year 1925-26 in the following Talukas.

Year	Taluka	District
1925-26	1. Jalalpore	Surat.
,,	2. South Daskroi	Ahmedabad.
,,	3. Taloda	West Khandesh.
,,	4. Shahada	Do.
,,	5. Malegaon	Nasik.
,,	6. Karad	Satara.
,,	7. Bijapur	Bijapur.
,,	8. Haveri (Karajgi Taluka).	Dharwar.
,,	9. Umbergaon	Thana.
,,	10. Matli (Taluka Dero Mohabat).	Hyderabad, Sind.
,,	11. Mirpur Mathelo	Sukkur.

Subsidies amounting to Rs. 23,627-8-0 have been paid to 29 of the above Associations during the year 1925-26. Subsidies to the following Associations were not paid during the year :—

1. Chorashi.
2. Jalalpore (newly formed).
3. South Daskroi do.
4. Malegaon do.
5. Taloda do.
6. Shahada do.
7. Karad do.
8. Ekruk Tank Bagayatdars' Sangh (Sholapur).
9. Athani.
10. Gokak.
11. Chikodi.
12. Gadag.
13. Ron.
14. Dharwar.

15. Hangal.
16. Hirekerur.
17. Kalyan.
18. Alibag.
19. Hyderabad.
20. Sukkur.
21. Halla.
22. Tando Allahyar.
23. Shahdadpur.
24. Ghotki.
25. Larkana.
26. Kambar.
27. Karachi (newly formed).
28. Dero Mohabat (Matli) do.
29. Mirpur Mathelo do.

Out of the above 59 Associations, 55 have been registered under the co-operative Societies Act and the following four are yet to be registered :—

1. Chorashi.
2. Jalalpore.
3. South Daskroi.
4. Ekruk Tank Bagayatdars, Sangh, Sholapur.

APPENDIX B

Summary of work done at the Poona Agricultural College for the year 1925-26

This is eighteenth year of the existence of the College.

Staff

Dr. W. Burns, D.Sc., who was on leave, took over charge from me on 13th February 1926. I was in charge during his absence. From the 6th April 1926, he is appointed Joint Director of Agriculture, Bombay Presidency, and I have been again acting.

Professor G. B. Patwardhan was appointed Acting Professor of Botany in place of Dr. W. Burns and Mr. L. B. Kulkarni, as Acting Assistant Professor of Botany from 6th April 1926.

Mr. J. P. Trivedi, Assistant Professor of Physics and Mathematics, was on leave from 1st November 1925 to 20th February 1926, when Mr. A. A. Vasavada acted for Professor Trivedi.

Mr. H. G. Baluch resumed his duties as Assistant Professor of Dairying from the 3rd January 1926.

Two demonstratorships have been created in the Agricultural Engineering Section from June 10th, 1926. Mr. M. B. Dave, B.A., B.Sc., and Mr. D. B. Hanmar, B.Ag., have been appointed to these posts.

A post of demonstrator in Agricutural Economics has also been created from June 10th, 1926, which Mr. T. G. Shirname, B.Ag., holds.

Rao Bahadur P. C. Patil continued as Professor of Agricultural Economics, Professor B. S. Patel as Professor of Agriculture, Professor D. L. Shahasrabuddhe as Professor of Chemistry. The staff of the Assistant Professors, Lecturers and demonstrators was not disturbed except in the cases given above.

The Senior B.Ag., students elected optionals as follows:—

	No.
(*a*) Intensive study of Certain Crops	16
(*b*) Advanced Plant Breeding	7
(*c*) Advanced Agricultural Chemistry	2
(*d*) Advanced Animal Husbandry and Dairying ..	5
(*e*) Advanced Agricultural Economics	9
(*f*) Advanced Horticulture	11
(*g*) Advanced Plant Pathology	1
Total ..	51

Examinations

Of the thirty-two candidates, who appeared for the B.Ag. Examination in March 1926, 25 passed—24 passed in 2nd Class, and One in pass Class.

Seventy-seven students apeared for the I.Ag. Examinations. Of these 5 passed in 1st Class, 40 in the 2nd Class and 11 in pass Class.

At the Final College Examination for Diploma 10 students appeared, out of whom 9 passed. Eight students appeared for the first examination in Diploma, out of whom 5 passed in 2nd Class and 2 in pass Class. One more I.Ag. Diploma student was directly promoted to the Junior B.Ag. Class, as he was a graduate of the Tropical School of Agriculture, Ceylon.

Students

The College census was taken at the end of June 1926. Seventy-two students (61 from Bombay Presidency including Sind and 11 from outside) were newly admitted to the I.Ag.

Eleven failed students (including men for Degree and Diploma) were allowed to rejoin, thus the total number of students on the roll of the I.Ag. Class on the day of the census was 83.

The number of Diploma students newly admitted to the I. Ag. Class, this year, is 5. This forms 6 per cent. of the men on the roll on the date of census. As a rule, students from the Presidency Proper, are not admitted unless they are deputed by a state or an institution.

Short Course

Men, who wish One Year's training mainly in Practical Agriculture with a small amount of training in the allied Sciences to enable them to grasp the principles, underlying agricultural practice, are admitted to this Course. Sixteen students were admitted during the year.

Special Course

Only two students are admitted to M.Sc. and Horticultural Course this year.

Details

The details of students for the year 1926 are as under :—

	No.
I. Ag. Class	83
Junior B.Ag. Class	66
Senior B.Ag. Class	51
Short Course Class	16
Special student for M.Sc.	1
Special Horticultural Class	1
Total ..	218

Out of the 218 students in the College this year, 67 are from Deccan and Khandesh, 47 from Southern Maratha Country and Konkan, 43 from Gujarat and 18 from Sind, making up a total of 175 from the Presidency proper and 43 from outside Bombay Presidency students. Of the 43 students there are 8 from South India and Ceylon, 9 from Nizam's Dominions, 5 from Central India, 5 from Madras, 4 from Bengal, 3 from Goa, 2 from Travancore, 2 from Berar, 2 from Central Provinces and one each from Mesopotamia, Ajmer, and Udaipur.

The classification of students also shows that out of 175 students from the Bombay Presidency (including Sind) 47 (or 27 per cent.) came from the four chief Agricultural communities of the Presidency, *viz.*, Marathas, Lingayats and Jains from the South and Patidars and Anavils in the North, 90 students (or 51·4 per cent.) from the Brahmin community and 15 (or 8·6 per cent.) Muhamadans and the remaining 66 from other communities.

Library

The Library now has 12,718 volumes, out of which 208 were added in the year 1925-26.

Other Institutions

The Dairy, Veterinary Hospital, Manjri Farm, Ganeshkhind Garden, &c., continue to be used for teaching purposes.

Visits

His Excellency Sir Leslie Wilson, Governor of Bombay, kindly presided at the time of our Annual Social Gathering held on 27th August 1925 and delivered an address.

Athletics and Social Activities

The various departments of the College gymkhana have been well patronized in their respective seasons. Our Cricket Team this year won the Inter-Collegiate David Cup. Hockey, Football, Basket ball and Volley ball are also favourite games.

In the Inter-Collegiate Sports, we carried off a number of cups and prizes and fared very well. Our students also gave a good display of Boxing. Considering the small number of men from which we have to draw on we have a very honourable place compared to the Arts Colleges.

We are contributing one platoon in the U. T. C., as usual.

The Students' Union an un-official body representing the students' interest and largely occupied in organizing social intercourse, continues to fulfil useful functions and is a great help to the life of the College.

The Esprit de Corps of the College grows daily ; and the twin ideals of the College, Science and Sport continue to be pursued with increasing eagerness. This sprit will not only produce good farmers, but also good citizens.

College Veterinary Hospital

The number of patients being treated has on the whole increased compared to 1923-24 and 1924-25.

The various improvements in treatment and other methods mentioned in various reports have been continued with success this year.

P. C. PATIL,
Acting Principal,
Agricultural College, Poona.

APPENDIX C

Annual Report on the work done under the Deputy Director of Agriculture, North Central Division, Nasik, 1925-26

Staff and Organisation

At the close of the year under report Mr. W. J. Jenkins, Deputy Director of Agriculture, in charge, was deputed to foreign service from 24th May 1926 and the writer of the report takes the opportunity of pointing out that the year's work was controlled and directed by him. Rao Saheb B. P. Wagholkar, Cotton Supervisor, Jalgaon, was deputed to foreign service for 6 months during which period Mr. G. P. Jambhekar, D.A.O., West Khandesh, acted as Cotton Supervisor. At the end of the year, Rao Saheb B. P. Wagholkar has been transferred from this Division and Mr. N. V. Bhagwat is working as Cotton Supervisor.

2. The reorganisation of the staff as arranged in last year at different centres has been found more effective since the propaganda work has extended in centres not worked uptill now. The trained Kamgar for the Dangs has begun his work as per programme laid out for him which is being directly supervised by the Dewan of the Dangs. Even with the reorganisation of the staff it has been found in the interest of work that to tackle problems on Girna Canals and other bandharas and in the remote talukas of the district some additional staff is necessary. The work of the Cotton Breeder too has been increased and it calls for sufficient assistance.

3. The Annual Staff Conference was held at Nasik when all the members were present. Important subjects like cotton manuring, improvement in local implements as well as of introduction of new implements, manuring of garden crops, working of Taluka Development Associations, were discussed in the meeting. Action is being taken on the resolutions passed by the Conference. It was prominently brought out that the clerical work of the district workers has been much increased which comes in the way of the legitimate work, *viz.*, propaganda.

4. The work of the staff was satisfactory.

Research and Experiment

Cotton Crop Improvement

5. It is now five years since the Cotton Breeder, Dhulia, has started his work on Dhulia Farm. His main work is to discover a type of cotton suitable for Khandesh which should be superior in staple length to N. R. and should give the same yield and ginning percentage as N. R. During the year under report additional work of trials of some of the promising strains was taken.

6. The Cotton Breeder, Dhulia, has succeeded to a certain extent in segregating certain strains from the Bani X Commilla hybride which are found to be superior in staple length. Of these, mention of two can

be made which are coming up and compare fairly well with N. R. in yield and ginning percentage.

(1) B XX 27 (Dhulia No. 1), though not perfectly pure, has so far been satisfactory and there is seed now sufficient to sow 108 acres. It has been proposed to sow 40 acres on Jalgaon Farm with this seed and the rest is being utilised for growing 68 acres with this seed on cultivators fields in the district.

(2) Another promising strain B XI 9 (34) (Dhulia No. 2) has shown results that seem to justify its purification and multiplication on an extended scale.

Statement below shows the comparison of these strains with N.R. :—

Type of Cotton	Average yield per acre	No. of counts	Valuation by Technological Laboratory I.C.C.C.	Remarks
1	2	3	4	5
N. R. ..	683 lbs. ..	10·5	335—40	Yield from 2 acre plots on Jalgaon Farm.
B X X 27 ..	751 lbs. ..	20·5	371	
B XI 9 (34) ..	....	30·5	384	Seed was not sufficient to sow minimum area.

7. Among the local isolated strains only one or two strains possess a ginning percentage from 38 to 42 and it is proposed to utilise these strains as materials for crossing.

8. As a result of five years' work a stage has been reached when the apparently narrow limits of selection have given place to hybrid isolation and it has been arranged for 2 definite crosses during the ensuing season.

Farm and Experimental Station Work

9. (*a*) *Jalgaon Farm, East Khandesh.*—The following average crop yields per acre were obtained on Jalgaon Farm during the year under report :—

Cotton 117¾ acres	.. 352 lbs. seed cotton
Groundnut 18¼ acres (Spanish peanut).	790 lbs. dry pods.
Jowar and udid 23 acres—	
Jowar.. ..	.. 399·7 lbs. grain and 918 lbs. kadbi.
Udid	.. 247 lbs. grain and 263 lbs. bhusa.
Wheat 21½ acres ..	.. 859 lbs. grain and 960 lbs. bhusa.
Gram 8¼ acres ..	.. 528 lb. grain and 595 lbs. bhusa.

10. Though the yields this year are lower than that of the average of the farm in previous years they were far better than those obtained by the cultivators in the district. The season on the whole was not favourable and hence the yield of cotton was low throughout the

District. The better yields on the farm are due firstly to good and timely tillage, secondly to effective manuring and thirdly to suitable rotation. The importance of good tillage was demonstrated by showing the crops on the farm to the cultivators from time to time.

11. The investigation work of cotton manuring was continued this year. The use of castor cake at the rate of 300 lbs. per acre to make up the deffciency of farm yard manure has been sufficiently demonstrated and there is rapid progress in its use amongst the cultivators. Owing to the rise in prices of castor cake investigation work is going on to find out substitutes for the same. Amongst the manures tried the following manures and mixtures are showing good prospects when compared with a dose of 300 lbs. of castor cake :—

(1) Groundnut cake 200 lbs. *plus* Sodium Nitrate 50 lbs.

(2) Sodium Nitrate 150 lbs.

(3) Ammophos 60 to 80 lbs. In the case of Ammophos the dose of castor cake was 400 lbs.

Details of experiments cannot be described owing to limitations of space.

12. The first mixture will be of economic importance since the cake is a local product and is available in large quantities. With these manures some of the proprietary manures are also showing prospects. Some of these have been tried for three years and have given a consistent increase in yield.

13. The dose per acre has been ascertained now. But these manures need further trials from an economic point of view and it is hoped that some suitable manures will be worked out in two or three years.

14. As the Kharif season was semi-famine due to failure of rains the yields obtained are very low. Late rains spoiled the crop and proper prices for the produce were not obtained. For the reasons given no definite opinion can be given about the suitability of these manures. The trials with these manures are being continued during the next season.

15. *Groundnut.*—The fresh seed imported from America three years ago has again given better yield than the local seed, the increase in yield per acre is 100 lbs. more than that of local seed. The pods are decidedly bigger and are preserved for seed purposes only.

16. Some of the proprietary manures were supplied for trial with this crop. As this is the first year of experiment and as the season too was not favourable owing to defective rains, no opinion can be expressed about the utility of these manures.

The average yield owing to the bad season was lower than those of previous years.

17. *Wheat.*—The trial of testing the six wheat strains on a small scale for the Crop Botanist, Poona, was continued this year. Strain No. 224 is showing some prospects of success.

18. The following new experiments were started during the year under report :—

(1) Wheat rolling.

(2) Double row system of sowing wheat.

As this is the first year of the experiments and as some good signs of success are seen the experiments are being continued.

19. *Khed Nursery, West Khandesh.*—It is gratifying to note that fairly good results have been achieved this year and 950 santra and mosambi plants were ready for sale during this year. There is a good demand and the nursery is making a good progress.

20. From the results obtained it is found that the suitable time for budding in Dhulia Taluka is from January to March. One thousand seedlings are ready for budding and the work will be taken up from January onwards. There is good progress in horticultural propaganda work too which consisted in pruning fruit trees, preparing mango grafts and giving advice on fruit growing.

20. *Belgaon Experimental Plot, Nasik.*—On this plot, the work reported in last year's report was continued.

Varietal trials of nagli, bajri, wheat and gram were repeated.

The wheat varieties, Pusa No. 12 and 4, are in demand since they have become popular in the district.

Spacing of 12″ to 15″ in Bhendi cultivation has given better results.

The treatment of Chillies with 400 to 600 lbs. of castor cake per acre has given good results and the use of this manure is being extended in the district.

District Work

21. Owing to limited space details of the research and propaganda work in the district cannot be described fully. Much of the work was the continuation and verification of the results obtained in previous years. Private individuals and Taluka Development Associations continued their help in this work.

22. This year's season was a peculiar one and nothing definite can be said about the results, and the trials will be continued next year.

Following are the crops with which experimental work was continued :—

(1) *Cotton.*—Manurial experiments with groundnut cake *plus* Sodium Nitrate, blood manure, " Ammophos " and proprietary cotton fertilizers were conducted at 132 places on cultivators' fields.

(2) *Wheat.*—The use of castor cake, 300 lbs, nitrate of soda, 150 lbs., and a mixture of sulphate of ammonia, 112 lbs., superphosphate, 224 lbs. and castor cake 300 lbs. per acre for irrigated wheat was continued this year and the results obtained are promising.

The varietal tests in Nasik district have again corroborated the superiority of Pusa No. 4 and 12 being high yielders and rust resistant. The demand for these wheats is increasing.

(3) *Rice.*—In Khandesh on bandharas a dose of 400 lbs. of castor cake per acre to rice crop has again proved useful giving on an average increase of nearly 400 lbs. of paddy per acre. Kolumba

No. 42 from Karjat has continued to yield more in Igatpuri taluka where it was tried, the increase being nearly 400 to 500 lbs. per acre.

The use of suphate of ammonia as rab substitute has been appreciated in Nasik district and the quantity used was over 4,000 lbs.

(4) *Chillies.*—The dose of castor cake reported last year, *viz.*, 400 and 600 lbs. per acre has given the same results, the increase in yield this year being from 350 to 425 lbs. per acre.

The treatment is being taken by the cultivators and the use of this manure is extending in all districts.

(5) *Groundnut.*—Groundnut mixture and superphosphate were tried. The results are not yet confirmatory.

(6) *Sugarcane.*—Increase in wide planting and the use of sulphate of ammonia as top dressing has been successfully demonstrated in Nasik and West Khandesh with a result of increase in sale of sulphate of ammonia and increased area with wide planting. The sale of sulphate of ammonia was 26,540 lbs.

(7) *Other Crops.—Nitrate of Soda:*—It has continued to give better yields of garlic and onions in Nasik and West Khandesh Districts. The dose recommended was 200 lbs. of nitrate of soda per acre.

The demand for this manure in Nasik district is increasing.

23. The newly introduced crop, *viz.*, potato, has given good results this year also and there is a fair prospect of the area being increased next year.

Miscellaneous

The need in the improvement of local implements to reduce the cost of cultivation by making them more efficient is very keenly felt since the wages of labour have gone very high. Efforts are being made to achieve the object as reported last year.

The Mechanical Assistant, N. C. D., is still working with the winnowing machine and expects to exhibit it at the Presidency Agricultural Show at Poona.

The problems reported last year are still awaiting their handling which could not be handled for want of adequate staff.

Propaganda

The Divisional Board of Agriculture, N. C. D., held four meetings at different centres in the Division.

The members both official and non-official have continued to take a very keen interest in the working and in making the work of the Board more useful. Several subjects of importance and useful nature were discussed.

Some of the important problems handled by the Board are :—

Subject	Actions taken and the progress made
(1) Schemes for cattle breeding societies and farms.	(1) Two T. D. Associations have come forward to start a cattle breeding farm of their own.
(2) Co-operative fodder storage.	
(3) Co-operative ginning and oil crushing factories.	(3) The scheme is being discussed and the lines to be taken are yet to be drawn.
(4) Classification of Khandesh Cotton in Bombay Markets.	(4) Committee has been appointed and its report is awaited.
(5) Co-ordination between the Professional Breeders and the Live Stock Expert for the improvement of cattle.	(5) The proposal is sent to the Live Stock Expert for his consideration.

Taluka Development Associations

In the North Central Division thirteen Taluka Development Associations are now working. All these have been registered under the Co-operative Societies Act and are getting the Government subsidy. During the year under report two new associations have been formed and registered, *viz.*, Shahada and Taloda. Proposals for the registration of one for Malegaon Taluka are before the Divisional Board for its approval and recommendation. Thus it will be seen that more than one-third of the tract is being worked with the help of the non-official organization for agricultural, co-operative and social development. For want of sufficient space details of all the activities of these Associations cannot be described. The main lines of their work on agricultural side are distribution of agricultural necessaries like seed, manure or supply of implements either on hire or on sale, demonstration of improvements in method and material, introduction of new crops, improvement of cattle by supplying premium bulls in certain cases, organisation of co-operative credit societies and advancement of co-operative propaganda. One or two Associations are thinking of having some organization of their own for cattle improvement. Great enthusiasm is shown by some of these associations in taking up the propaganda work. These have proved a very useful medium in introducing the activities of developing departments both Agriculture and Co-operative amongst the cultivators. All Associations have their own fieldmen or kamgars who carry on the propaganda work.

Statement below will show the amount collected by these associations and items of expenditure :—

Name of T. D. A.	Balance. + Amount collected	Government subsidy	Amount spent				
			Establishment and office	Implements, etc.	Supply of manure, seed, etc.	Demonstrations	Other charges
1	2	3	4	5	6	7	8
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
Nasik ..	2,775	1,000	869	963	105	65	109
Kadwa canals (Ozar) District Nasik ..	3,200	1,000	540	523	138	28	21
Satana ..	2,067	850	774	3	1,259	8	82
Dhulia ..	4,873	1,000	901	242	196	39	473
Nandurbar ..	2,366	1,000	476	190	275	359	2,067
Sindkheda ..	5,060	500	565	137	96	50	98
Jalgaon ..	17,380	2,000	1,737	805	127	46	626
Pachora ..	18,471	1,000	1,826	169	100	134	63
Raver ..	9,767	1,730	1,689	257	143	43	183
Bhusawal ..	2,859	1,000	1,078	173	517	23	450
Edlabad ..	..	500	..	..	..	....	..

The difficulties in the working of these associations have already been pointed out in the last year's report. A move was made to make better arrangements for the collection of subscriptions from members and the Commissioner, Central Division, has issued orders by which village officers can be requested to collect these subscriptions on commission basis—one anna in a rupee. The scheme is showing better working and the fieldman will be liberated from this heavy task and will be able to devote his attention to his legitimate work, *viz.*, propaganda.

The Associations are making good progress in this work and the people also are appreciating their work. However better staff and supervision from the members is necessary and attempts are being made in that direction.

Non-Credit Work

Attention to fostering of non-credit agricultural co-operation was given by all the members of the district staff. The necessity of forming societies for the protection of crops from wild animals was explained to the people where there was much trouble, *viz.*, in Sakri taluka in West Khandesh and in parts of Baglan and Kalwan talukas in Nasik district. Attempts are being made to organise fencing societies at Dhadne, Bej and Taharabad in West Khandesh and Nasik districts respectively. Plans and estimates for the work are ready and the people are being moved to collect funds.

The Implement Society organised at Pimpalner is working satisfactorily and collected a hire of Rs. 532-14-0.

A Manure and Seed Society at Dabhadi in Malegaon taluka of the Nasik district has been organised and funds are collected. The papers have been submitted for registration.

A ginning society has been organised at Nandgaon in Nasik district and is registered under the Co-operative Societies Act.

The relation between Co-operative and Agricultural officers remained cordial and they have helped each other in their work.

Departmental Work.—No large demonstrations or shows were arranged but major demonstrations were held in Nasik and Khandesh districts. Many of these were arranged with the assistance of Revenue officers and taluka development associations. In addition to these, arrangements were made to hold small demonstrations at the time of Revenue Jamabandi at several centres as per Government Resolution, Revenue Department, No. 1801/24, dated 2nd July 25. These were attended by a fairly large number of cultivators which resulted in the spread of agricultural improvements in these localities.

This year many small demonstrations were arranged in which iron ploughs and steeping of jowar in copper sulphate solution were successfully demonstrated. The latter work was the main feature of some of the demonstrations. This resulted in a large sale of copper sulphate packets which in only two Khandesh districts comes to over 28,000 packets and over 32,000 in the Division. The demonstrations if analysed were of (1) Crop Demonstrations, (2) Working and use of improved implements including iron ploughs, (3) Copper sulphate steeping for Jowar, (4) Poona furnace for *gul* boiling, and so on.

In crop demonstrations the chief items were better manuring for cotton, rotation in cotton cultivation, use of ammonium sulphate for sugar-cane, nitrate of soda for onions, garlic and irrigated wheat and other approved manures for other crops. Also the advantages of growing suitable varieties of staple crops such as N. R. Cotton, Akola bajri, Spanish and Big Japan groundnuts, Kolumba No. 42 rice were demonstrated.

All these demonstrations were arranged on cultivators fields the result of which was that the people are coming forward to take up the improvements.

Looking to the importance of the work the grant sanctioned for the purpose is found to be inadequate. The real work is to see that the recommendations of the Agricultural Department reach all the cultivators in the interior. It is not sufficient to investigate a problem but when once a problem or improvement is found fit for introduction it must reach the cultivators and this can only be done by holding demonstrations. These may even be small in nature but require some money to arrange. It is therefore hoped that adequate amounts will be provided for both for Investigation and Demonstration work.

Service

A. Extension of N. R. Cotton.—This extension work was carried out through co-operative agencies and Taluka Development Associations. The work is progressing satisfactorily.

As the season was bad the pure N. R. seed produced on Jalgaon and Dhulia Farms was 25,000 lbs. which was distributed to ten taluka development associations, five co-operative credit societies and to the three co-operative bank branches at Dhulia, Shirpur and Parola and also to two individual cultivators. Smaller quantities were sent outside the Division. The total quantity of seed distributed of 1st, 2nd and 3rd class seed both in and out of Division is 2,31,920 lbs. Besides the above quantity several cultivators are purifying their own seed and sell it with the help of Department.

B. Implement Depôts.—The Department maintained 12 implement depôts in this Division. These depôts serve to provide implement on hire, sell manures and seed, etc. The hire received during the year was over Rs. 458 as against Rs. 1,300 of last year. The reasons for fall in hire collected are :—

(1) Cultivators knowing the usefulness of iron ploughs have purchased their own ploughs.
(2) Private persons have taken up this work and have kept ploughs on hire.
(3) Associations have been doing this work on larger scale than in the past.
(4) Some depôts are newly opened and will take time to attract the attention of the people.
(5) Some of the implements in depôts are worn out and hence the stock is small.

But the other work, *viz.*, supply and sale of seeds and manures has increased and the sales of this year are more than in the past though this work has also been taken up by the Taluka Development Associations in certain places.

Eight Balsar Rahats at a cost of Rs. 3,400 were supplied to cultivators in Nandurbar Taluka. They are all fixed and giving satisfactory work.

Each Rahat with a pair of bullocks lifts water from a well 20 feet deep equivalent to the capacity of three ordinary mhots. All these are working to the owners satisfaction.

Presidency Show at Poona.—The information of the big show has been given to the people all over the districts of the Division and samples are collected for exhibiting the same. It is expected that a large number of cultivators will visit the show if the season turns out a fairly good one.

Crop Protection.—There is a serious trouble from wild animals especially pigs to crops and the damages in certain tracts are heavy. The line of work taken is in three directions, *viz.* :

(1) Recommending gun licenses to suitable cultivators.
(2) Organising fencing societies.
(3) Pig poisoning.

Few licenses were recommended and given in East Khandesh and their use by cultivators will be watched.

Work done in connection with item No. 2 has already been described under non-credit work while in pig-poisoning though the kills were few the effect due to scaring away the pigs was observed to be more for a certain period. The actual number of pigs killed was comparatively small but the pigs did not visit the places under operation.

If the result of the work of the Agricultural department is to be judged from the acceptance of the improvements suggested by the department by the cultivators, the following few introductions of most beneficial nature may be enumerated which will clearly show the useful work done by the department in the North Central Division—

(1) The iron plough has been popularised and they are being used on an extensive scale, the cultivators either owning their own ploughs or hiring them for ploughing their own lands.
(2) The extension of groundnut cultivation, especially the early variety, in Khandesh. In the year 1912-13 the area under this crop was 4,119 acres while in the year 1924-25 it is 140,092 acres.
(3) *Extension of N. R. Cotton.*—The cultivators have so much appreciated the value of this cotton that requisitions for the supply of pure seed are pouring in both from inside and outside the Division. We are unable to meet the demand with the present arrangements.
(4) *The use of concentrated manures.*—The value of ammonium sulphate in sugar-cane cultivation and also as rab substitute has been acknowledged and the demand for the same is increasing. The use of Nitrate of soda for onion garlic cultivation has gained ground and it is now used in Nasik District where onion cultivation is on a large scale.
(5) Use of castor cake in cotton cultivation has been taken up by cultivators in Khandesh District. These are the few instances which will show what useful work has been done by the department.

Mechanical Assistance.—The Mechanical Assistant has completed two installations, *viz.*, one pumping plant at Faizpur in East Khandesh and one power-crusher at Wakad in Nasik District. Both these works were done to the satisfaction of the owners and are giving good work. The crushing plant at Taharabad in Nasik District was set in working order and is now giving satisfactory work. At all these places the Mechanical Assistant stayed for some days after erection work to train their men for working of the machines.

He has surveyed sites of Fencing Societies and has prepared plans and estimates which are under consideration of local bodies.

With a view to find out the suitability of pumping sites proposed by people and also the sites for putting bunds for nallas he visited several places and has given necessary advice to the applicants.

Boring Work.—All the three machines for this Division have now been converted into power machines and are now working in East Khandesh. As reported in the last year's report the work has been concentrated in one district in order to have proper supervision. As the machines were undergoing conversion during the year under report there were few working days. One of the machines was received from Dapuri Workshop as late as in May 1926 and the other which was converted into power at Pachora was ready for work in December 1925.

There is no Boring Assistant and the work is supervised by Mr. Moghe, Superintendent, Jalgaon Farm, in addition to his own duties.

Though with this arrangement the working has improved to a certain extent still it cannot be said satisfactory. In order to get out sufficient work from the machines it is necessary to have constant supervision of an expert man on the mechanics and unless this is done satisfactory work will not be turned out.

Ten bores were taken during the year out of which one is successful and three are imcomplete. The total depth bored is 375 feet and the number of working days was 198 only.

Education.—Dhulia Vernacular Agricultural School has been working for three years. All the work of the school is now carried on its own premises hitherto known as Model Farm, Dhulia, except workshop training which is being given in the Technical School, Dhulia. The total number of students undergoing the training was 29, 11 being in second year and 18 in the first. Taken by districts the number of students was :—

East Khandesh	..	..	12
West Khandesh	..	..	12
Nasik	..	..	5
			29

The Annual Examination was held by Mr. K. M. Pawar, Inspector of Agricultural Schools, assisted by Mr. Mr. G. P. Jambhekar, D.A.O., Dhulia.

Eight first year and eleven second year including one ex-student passed successfully. The examiners have remarked that the boys of both the classes have not done well in agriculture. Systematic training in this subject is necessary. The progress was fairly good and a little improvement was seen in practical work. Rs. 3,751 were collected by Local Committee of the school from District Boards and Municipalities in the North Central Division.

This sum is employed to defray the boarding expenses of the students.

No student of the Poona Agricultural College has yet come to take the advantage of the course in farm management and economics which was instituted at Jalgaon Farm.

There are five agricultural-bias-classes in this Division and necessary advice on cropping, etc., is being given by the District staff. The schools are :—

(1) Ozar, and (2) Dabhadi in Nasik District, (3) Asoda, and (4) Vaghali in East Khandesh, and (5) Kusumba in West Khandesh.

Mention may be made of the visits of Honourable Sir C. V. Mehta, Revenue Member, to the Dhulia School. The Honourable Member went over the working of the school as well as the work of the Cotton Breeder. The Honourable Mr. A. M. K. Dehlavi, Minister in charge of this department, also visited Jalgaon Farm.

In concluding this report the sympathy, co-operation and help received from the members of the Government Departments and private individuals and the interest they have shown in the welfare of cultivators of this Division is acknowledged.

K. M. PAWAR,
Deputy Director of Agriculture,
North Central Division, Nasik.

Nasik, 31st July 1926.

Statement of particulars of bores made by the Boring Assistant,

Serial No.	Name of work or Landlord	Name of Taluka	Name of Village	Diameter of bore	Depth of boring	Water before in gallons per hour
1	2	3	4	5	6	7
1	Mr. Kapurchand Bachwaraj.	Pachora, East Khandesh.	Pachora, East Khandesh.	3"	62'—0"	*Nil*
2	Mr. Abdul Majid Dadamiya Deshamukha.	Do.	Do.	3"	50'—0"	Not known
3	Mr. Allibhai Tayabji Bohori.	Do.	Do.	3"	33'—0"	*Nil*
4	Bhagirath Mill, Jalgaon	Jalgaon, East Khandesh.	Jalgaon, East Khandesh.	3"	9'—3"	....
5	Mr. Manikchand Vithooram.	Jamner, East Khandesh.	Jamner, East Khandesh.	3"	98'—0"	*Nil*
6	Mr. Govindas Govardhan.	Nandurbar, West Khandesh.	Nandurbar, West Khandesh.	3"	55"—0'	Not known
7	Mr. Supdu Sadashiv ..	Do.	Vagoda ..	3"	50'—0"	....
8	Mr. Nanasaheb Phadke ..	Bhusawal Vadoda.	Vadoda ..	3"	..	....
9	Mr. Vajirkha Kalekha ..	Bhusawal ..	Sakegaon ..	3"	..	....
10	The Manager Agriculture and Development & Co.	Nasik, Pimpalgaum Garudeshwar.	Pimpalgaum ..	3"	35'—0"	....

North Central Division, Jalgaon in 1925-1926 from 1st July to June 1926

Water after boring in gallons per hour	Departmental charges	Labour charges	Total cost of boring	Cost per foot	Results	Remarks
8	9	10	11	12	13	14
	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.		
Nil	98 8 0	166 10 0	265 2 0	4 4 6	Unsuccessful.	
Not known	52 8 0	136 12 0	189 4 0	3 14 6	Do.	
Nil	57 8 0	82 14 0	140 6 0	4 6 6	Do.	Abandoned by the owner.
....	....	....	....	....	....	Work on hand.
	207 0 0	295 6 0	502 6 0	5 2 0	Successful.	
Not known	86 8 0	182 4 0	268 12 0	4 14 3	Unsuccessful.	
....	52 8 0	111 14 0	164 6 0	3 4 0	Do.	
....	....	....	....	....	....	Work on hand.
....	....	....	....	....	....	Do.
Surface bore	74 0 0	112 8 0	186 8 0	5 3 6	Unsuccessful.	Machine removed for conversion.

APPENDIX D

Annual Report of the Deputy Director of Agriculture, South Central Division, Poona, for the year 1925-26

The operations of this division may be conveniently reported under the following sections :—

I. Research.

II. Propaganda.

III. Agricultural Organization—

- A. Taluka Development Associations.
- B. Non-credit Co-operative Societies.

IV. Agricultural Service—

- A. Boring operations.
- B. Engineering Advice and assistance.
- C. Pig Killing operations.
- D. Famine fodder supply.

V. Agricultural Education.

VI. Departmental Administration.

Section I

Research

The year under report was fairly good for the cane crop.

This is the third year of the experiments of the newly introduced Cropping Scheme at Manjri and the following are the series of experiments taken up :—

(1) Time of application of top-dressing.

(2) Quantity of Nitrogen required to produce a heavy crop.

(3) Efficient and economic substitute for Farm-yard Manure, *i.e.*, sann manuring.

(4) Suitable crops for rotation with sugarcane.

(5) Quantity of irrigation water and the interval between two consecutive waterings.

(6) Different methods of planting and cultural operations.

(7) Selection of profitable varieties.

(8) Botanical study in the field and chemical control of Gurhal operations.

(9) Study of tillering and root system (new).

The results of the above experiments can be summarised as follows :—

(1) The three years' results so far obtained show that the standard method is the best and the rest have been quite inconsistent and hence the experiment in future has been abandoned after coming to this conclusion and this method is being recommended to cultivators. The details of three doses of standard method are as below :—

1. One-third the total quantity of Nitrogen from Ammonium Sulphate given at three weeks from planting.

2. One-third of the total quantity of Nitrogen from ½ to ½ of Ammonium Sulphate and Cake given at eight weeks from planting.

3. One-third of the total quantity of Nitrogen from Cake alone given at earthing up.

(2) This experiment, as reported in the last year's annual report, was tried in light as well as heavy soil. The results so far obtained show that 75 lbs. Nitrogen has given the lowest yield and the yields obtained in plots treated with 150 lbs. Nitrogen and above that quantity are not in proportion to the increase of the Nitrogen. The experiments require continuing for some years, to come, to some definite conclusion as this is the first year when the results have not been vitiated by any disturbing factor.

(3) The results obtained this year in this series have corroborated results of past two years and go to prove that safflower cake has given best results. The yields obtained for three years are tabulated below.

Treatment	Weight of Gul in lbs. per acre			Average in lbs.	Remarks
	1923-24	1924-25	1925-26		
Farm yard manure = 200 lbs. N.	5,537	8,537	11,462	8,512	The figures are the average of original and duplicate plots.
Safflower cake = 200 lbs. N.	7,176	8,863	11,280	9,106	

(4) The three crops tried in rotation with sugarcane were chillies, sann, and groundnut. The cycle of the crop is complete in the two crops except chillies. However the results obtained go in favour of getting more crop of sugarcane after chillies and next to chillies sann. Groundnut as a rotation crop is to be disfavoured.

(5) In this series of water experiments there are two types of experiments laid down :—

(*a*) Interval between two waterings.

(*b*) The quantity of water required by cane crop.

(A) The results obtained this year in interval series are corroborative to the last two years ; but the advantage is not so marked as in the previous two years.

(B) In the quantitative series the results obtained this year are not corroborative and hence the experiment is being continued to arrive at definite conclusion.

(6) The methods of planting as practised are 5′ and 4′. The results obtained during this year and in the past two years prove that 4′ method has given the highest yield.

(7) The sugarcane varieties as reported in last year's report were tried again, to find out whether the varieties found superior in the past year over Pundia keep the same in standard, and the results obtained this year show that except Waxy Red and White Transparent the rest have done well. Out of the whole lot of varieties D. 109, Manjav, Waxy

Red, H. M. 544 and H. M. 600 will be continued for trial in comparison with Pundia.

(8) The work of Botanical and Chemical study in sugarcane is being continued.

(9) The results obtained in thinning cane at the time of earthing up have been found to be most beneficial this year, which have corroborated last year's results.

Description of treatment	Weight of Gul per acre in lbs. in the year	
	1924-1925	1925-1926
(1) Tillers removed at 4 months ..	12,456	11,014
(2) Tillers removed at earthing up ..	11,365	12,330
(3) Check with no tillers cut ..	7,451	8,613

As regards results of selected and unselected sets in planting canes the yields are non-consistent.

The holding of the sugarcane class was again a special feature of the present year. The difficulties reported last year continued and were met similarly by pitching tents and erecting *kacha* sheds. The number of students attending were 32, *i.e.*, greater by one than last year, and represented the main sugarcane centres of the Deccan. It can be said that the students who came, went back thoroughly satisfied and completely converted to the improved and economic method of cane cultivation and gul making worked at Manjri.

Profit and Loss.—The cost of cultivation of Pundia cane at the Farm per acre under Manjri method of cultivation with the usual top-dressing, supplying only 150 lbs. Nitrogen per acre and taking into consideration all possible items of expenditure such as interest on outlay, supervision charges, rent of land, etc., comes to a total of Rs. 635-9-0, which is less by Rs. 25-1-0 than that for the previous year (with the cost of the unit of labour taken at 11 annas, which is the same as last year).

The income obtained was, however, Rs. 926-6-0, which is less by Rs. 192 than last year, principally due to the lowered rate of sale of gul from 8 lbs. per rupee in 1924 to 10 lbs. per rupee during the year under report; and the average yield of the gul of the whole area of Pundia cane was 9,264 lbs. per acre and the net profit only Rs. 290-13-0.

Baramati Farm.—This is situated on Nira Left Bank and the results obtained on Manjri Farm are tried for confirmation. This is only the second year of laying out new scheme of experiments and hence it will take some time to arrive at conclusive results. Several sugarcane varieties were tried and this year B 3747, Red Sport, B. 208, and H. M. 544 have given better yields.

Kopargaon Farm.—To confirm the results obtained on Manjri Central Research Sugarcane Station, in Godavari Canal Tract a small area is set

apart from Kopargaon Fodder Farm. During the year under report the following corroborative conclusive results were arrived at :—

(1) *Different methods of planting and cultural operations.*—In this series 4′ method has surpassed the 5′ method in yield.

(2) *Selection of profitable varieties.*—Several varieties were tried in addition to the ones already reported in last year. This year again the yields of D. 109 and Java were the best, giving 12,000 lbs. and 7,660 lbs. gul respectively. As D. 109 has yielded best and surpassed Pundia nearly 23,000 sets sufficient for three acres have been distributed to cultivators.

Section II

Propaganda

The principle items of the programme of the District staff are as under :—

(1) *The popularization of the Copper Sulphate treatment of Jowar against smut.*—Intensive propaganda with regard to demonstrations and distribution of copper sulphate was done in this Division in co-operation with the Revenue Officers and Irrigation Officers. As a result of which 29,998 packets were distributed during the year in this Division. The following tabulated statement will show distribution district by district. In this propaganda Mamlatdar, Bhimthadi (Rao Saheb B. K. Deshmukh), Mr. R. S. Bapat, Assistant Engineer, Baramati, and Mahalkari, Jamkhed (Mr. D. N. Sabnis), helped a good deal. Mamlatdar, Bhimthadi (Rao Saheb B. K. Deshmukh) steeped 28,000 lbs. of seed of cultivators. Mr. Bapat and the Mahalkari (Mr. Sabnis) distributed 5,000 and 5,700 packets. The Madha Taluka Development Association distributed 2,084 packets.

Name of District	No. of packets distributed in 1925-26
(1) Poona	5,062
(2) Sholapur	5,229
(3) Nagar	11,643
(4) Satara	1,656
(5) Canal Tract	6,408
	29,998

(2) *Introduction of new crops and varieties.*—The principal work under this section comes under the following sub-heads :—

(1) Introduction of N. R. Cotton in Nagar, Sholapur districts and Canal area.

(2) Introduction of fresh seed of Japan big and Pondicherry in Satara District and Spanish Peanut in Nagar District.

(3) Introduction and dissemination of Akola Bajri.

(4) Introduction of new varieties of sugarcane.

(5) Introduction of turmeric.

1. *Introduction of N. R. Cotton.*—In Nevasa and Sheogaon Talukas of Nagar District 2,000 lbs. N. R. seed second generation from Jalgaon was given to seven cultivators who had an area of nearly 150 acres. This has produced nearly 30,000 lbs. N. R. seed which has been distributed. There is now keen demand for this seed by cultivators in these talukas.

On the canal area cotton as a diversified crop is showing signs of superiority over other crops introduced. The yields obtained vary from 900 to 1,400 lbs. seed cotton per acre. The higher yields with less labour have created a liking in cane growers for growing cotton. As a consequence nearly 15,000 lbs. N. R. seed, second generation, imported from Khandesh has been distributed. The cultivators' methods of growing are defective and hence cultivators are advised on the same by printing a leaflet and distributing the same. The experience of past year had shown that planting in May is always beneficial and hence the Irrigation Department on Nira Canal made the water available in May. It is found that on Nira Canal the area under cotton this year is far more than in the past.

In Sholapur District area of N. R. cotton under well irrigation is increasing. 16,414 lbs. of N. R. seed was imported from Khandesh and distributed to cultivators. Besides this quantity several merchants imported Khandesh seed and distributed the seed. Thus a large quantity has been distributed. A great improvement has been made in sowing with a wide drill and this has been adopted recently by great many cultivators. Similarly manurial trials with cotton fertilizer (from Union Agency) were made, which are showing signs of success. The yield obtained with fertiliser was 1,449 against 981 lbs. no fertiliser.

2. *Introduction of fresh seeds of Japan big, Pondicherry and Spanish Variety in Poona and Nagar.*—The new seeds of Japan big and Pondicherry which were distributed last year in Satara District and on canal area, have been finding in favour with cultivators and they are being grown on large scale. Nearly 3,066 lbs. of Pondicherry seed was purchased and distributed in Patan Taluka. The cultivators like the new seed as it contains more oil per cent.

Spanish Peanut is also being grown in Nevasa and Shevgaon Talukas and it is hoped that this variety will slowly spread in these parts.

3. *Introduction and dissemination of Akola Bajri.*—The seeds of Akola Bajri introduced in Poona, Satara, Sholapur and Canal area have shown that the yield is nearly 20 to 25 per cent. more than the local variety and hence there is now extensive demand of cultivators for this seed.

4. *Introduction of new varieties of sugarcane.*—The varieties of sugarcane reported last year had again been tried by Mr. G. G. Shembekar and

H. M. 544 showed its superiority over the rest. The results obtained are tabulated below :—

Name of variety	Boilings per acre	Quantity of gul in lbs. per boiling
1. Pundia	64	219 lbs.
2. H. M. 544	62	231 ,,
3. Red sports..	56	232 ,,

On the Godavari Canal Red sport and D. 109 are promising and stand next in merit to H. M. 544.

On the Nira Canal as H. M. 544 showed superiority the Department has distributed sets at concession rate (*i.e.*, at half rate) to nearly 42 cultivators. This year there is nearly 25 acres area under this variety. Similarly on Godavari Canal, sets of D. 109 and H. M. 544 were distributed to cultivators.

5. The turmeric crop has received a check owing to lowering down of prices even in spite of better yields obtained.

(3) *Implement—Implement Depôts.*—There were 23 Depôts in this division and the hire received during the year amounted to Rs. 1,100. The idea of starting and working new depôts is being given up as the work of this type is now being done by Agencies like Co-operative Implement Societies, private individuals, etc. The work of these agencies is rapidly increasing. The progress of the Implement Societies can be very well seen from the hire received of these Societies in Nagar District.

(4) *Spraying Operations.*—Spraying for checking diseases of crop has been found more effective and the cultivators now appreciate the use of it and adopt it. The following statement will show the list of crops sprayed in different districts :—

Name of place	District	Crop sprayed	Area in acres	Spraying done by Department or Association	Disease for which sprayed
1	2	3	4	5	6
(1) Khed ..	Poona ..	Potato ..	60 (from 7 villages).	By association and Department.	Tambera.
(2) Do. ..	Do. ..	Chillies ..	17 (belonging to 27 cultivators).	Department ..	Leaf Curl.
(3) Walwa ..	Satara ..	Do. ..	4	Do. ..	Mirya.
(4) Tadwal ..	Sholapur ..	Betel Vine ..	1	Do. ..	Tiba.

The effect of this spraying is that the crops have been saved and the cultivators have realised the comparative benefits derived from spraying.

(5) *Horticultural Operations.*—On the canal area the planting of fruit trees such as oranges, mozambiques, figs, grapes and chikoos is increasing

year by year. The whole survey of Nira Right and Left Bank was done this year by the Horticulturist to the Government of Bombay and he has advised fig and grape cultivation in lighter soil tracts. On Godavari canal specially area is increasing under grafted mangoes.

Diseases of fruit trees, such as gum disease of mozambique, mildew of grapes and mango stem borer, were attended to and treated successfully in several gardens.

(6) *Land Development Schemes.*—Under this head several schemes were suggested from time to time by the staff working in this division. Amongst all these a tank scheme at Undewadi in Bhimthadi Taluka, specially from a place noted as Famine striken, was suggested in 1923 by Mr. S. B. Jadhav, District Agricultural Overseer, Baramati. A short description of the scheme will give an idea how the work had been useful and appealing.

" At Undewadi village there were nearly 20 wells, situated in a low lying tract. Above these wells a good situation for bunding was traced. A bund 1,300′ × 12′ × 45′ of earth was suggested which would not allow the Rain water from the surface area of ½ mile × ½ mile to flow down. Thus accumulation of water in this area, after bund was put, would permeate through the substrata below, and supplement water-supply in wells down below. These wells before the Bund was put, had only sufficient water, if there was good rainfall, to irrigate 30 to 40 acres of Rabi Jowar area and get a medium crop. But if there was no rain, the supply from these wells was scarcely sufficient for the village people and cattle throughout the year."

The scheme was examined by Land Development Officer and submitted for loan to Provincial Co-operative Bank. But owing to non-organisation of society, the loan was not obtainable. In the mean while Rao Sahib B. K. Deshmukh Mamlatdar Bhimthadi realised the importance of the scheme from economic aspect of the Taluka and concentrated his efforts to make it a success. He advised the culivators and made them work with their bullocks and own labour for the erection of Bund, which was completed in August 1925. Besides their own labour he made arrangements to advance Tagai of Rs. 750 to three men. Thus the erection of Bund was in time and soon after September and October Rains, these 20 wells were in a position to grow in 1925-26 a crop of Jowar over an area of 90 acres ; whose yield was bumper as against 30 to 40 acres medium crop, and 20 acres in addition as a summer crop which consists of 4 acres sugarcane. Now Rs. 1,950 have been advanced as Tagai for the further work of the Bund. This scheme has appealed to cultivators and some 4 or 5 such schemes are under contemplation in the Bhimthadi Taluka.

(7) As regards the methods adopted for conducting propaganda they may be summarised as follows :—

1. Organised Shows, 2. Implement Demonstrations, 3. Manurial demonstrations, 4. Trial of new crops, 5. Steeping, spraying, etc., and 6. Organisation of Depôts and Implement Societies, seeds and Manure Societies, etc.

A summary of the work done in each district is given below :—

Poona District.—A big Show was organised with the help of the Municipality at Alandi, at the time of the Kartiki Fair (12th November) which was largely attended. Five Magic lantern lectures were given at Alandi, Malegaon, Khed, Rakaswadi and Gulani. Similarly eight implement demonstrations were arranged in Junnar Taluka. Demonstration plots of Kolamba rice strain, Akola Bajri and Spanish Peanut were arranged in Junnar Taluka at several places. These have shown better yields over local varieties. Kolamba strain has given 18 per cent. more yield, whilst Akola Bajri nearly 27 per cent. and Spanish Peanut yielded on an average 1,386 lbs. of dry nuts. The new varieties of sugarcane H. M. 544 and D. 109 are being popularised on Mutha Canal.

Ahmednagar District.—During the year two big demonstrations, showing the improved method of growing sugarcane and preparing gul, specially for well cane growers were arranged and these were successful. In addition to these, 4 demonstrations of turmeric, tobacco and potato growing were arranged. Demonstration plots to show better methods as well as new varieties of crops were arranged. These were ridge method of growing lucerne, Satara method of tobacco growing turmeric and Potato growing. Potatoes under irrigation have yielded 7,600 lbs. per acre but further trials are essential.

Satara District.—In the Satara district 20 demonstrations of improved furnace for gul making were conducted in which the saving of fuel and time was shown to the public. Similarly scum strainer was introduced at several places. A trial of newly introduced Manjav variety of sugarcane from Kopargaon Farm was made which yielded 6,272 lbs. gul. The variety is found early and drought resisting.

Sholapur District.—Seventeen demonstrations, 16 implement and one bunding were conducted during the year at 17 places. These were largely attended by cultivators. The wide method of sowing crops by Tiphan is now freely adopted in the district. In Sholapur district bunding and putting tals are now very common and an experiment was conducted to show the use of Gallows plow for doing the digging work economically and the use of shovel for raising the bund against the carrying of earth over head. In both cases $300' \times 7' \times 2\frac{1}{2}'$ bunds were put up. The cost in the improved method came to Rs. 6-10 over the local method of Rs. 14-4, a decided saving of 100 per cent. This is being demonstrated and advised in the district. New crops like Potatoes and Akola Bajri were tried and these are showing favourable results.

Canal Area.—This includes, Nira, Pravara and Godavari.

On Nira 5, Godavari 2 and Pravara 5 big demonstrations were conducted to show turmeric curing, sugarcane varieties, Java method and implements and manures. These were largely attended by cultivators and irrigation officers. In the spacing experiments of sugarcane, conducted in culivators' fields 4' method has given the highest yield over 3 and $3\frac{1}{2}$ feet. Akola Bajri trials in several villages has given nearly 19 per cent. more yield and the seed is liked by cultivators. On the Nira Canal, Baramati Irrigators Association distributed a large quantity of

N. R. seed, Potatoes, Akola Bajri seeds and Ginger sets. The Association is going to be registered under Co-operative Act. The credit of the whole work through the Association is due to Mr. R. S. Bapat, Assistant Engineer, Baramati.

Section III

A

Agricultural Organisation

Taluka Development Associations.—In this division there are eight agricultural associations out of which seven have been registered under Co-operative Act and one on the way of registration. Their distribution is as under :—

(1) Poona	.. ..	(1) Khed. (2) Junnar.
(2) Satara	.. ..	(1) Satara. (2) Walwa. (3) Karad (new).
(3) Sholapur	.. ..	(1) *Ekruk Bagayatdar Sangh. (2) Madha. (3) Karmala.

The chief works done by these associations are summarised below :—

(1) Distributed copper sulphate packets and demonstrated steeping jowar in several villages, Madha Association alone distributed 2,084 packets.

(2) Spraying of crops to check diseases. Khed Association sprayed 60 acres of Potatoes against Tambera and Walwa Associations sprayed 13 acres of chillies against Myria.

(3) Distributed N. R. Cotton seed, Japan, Pondicherry, Spanish Peanut and Akola Bajri, Vegetable seeds in large quantities.

(4) Demonstrated (1) Use of Ammonium sulphate to sugarcane.
(2) New implements such as Duch hoe, wide drill for Shalu Jowar and Cotton.
(3) Convened the Taluka Co-operative Conferences.

Out of the eight agricultural associations only six worked during the year, the Ekruk Bagayatdar Sangh did not put in any work and Karad Association was a new one.

Section III

B

Non-credit Societies.—On the 1st April 1925 there were 39 Non-credit Societies, out of which three Societies (one Implement Society, one Dairy and one Farming) were cancelled. During the year under report one implement and two Taluka Development Associations were registered. Thus the total number 39 has remained constant.

*Not registered.

Amongst Non-credit Societies, Implement Societies reported last year working in the Ahmednagar District have again put in very good work. Sheogaon, Pathardi and Jamkhed realised respectively Rs. 1,484, Rs. 1,502-8-6 and Rs. 588-1-0 hire from implements against Rs. 1,450, Rs. 852 and Rs. 460 of the last year. Similar types of societies started in Sholapur have been progressing well.

Haveli Gul Sale Society is doing good work and handled a produce of nearly 3½ lakhs in the year under report.

Section IV

Agricultural Service

Agricultural service.—The service under this head can be mentioned in the following form :—

Boring operations.—In the year under report six Boring Machines were working in Poona, Sholapur and Ahmednagar districts. Besides six, one Calyx Boring Machine was transferred from Agricultural Engineer to me and it worked in Poona District after Alandi Show. As the Hand Power Machines were sent to Agricultural Engineer for conversion into Power Machines, the work in the Division this year recorded per machine has been less when compared with previous year (Nos. 25 and 17 Hand Machine stopped work for six months and Nos. 28 and 13 stopped work for 3 months and 28 days). Besides these the rest of the machines had to stop work for repairs from 1 to 2 months. In all 53 bores were made out of which 23 were successful and 29 were unsuccessful and four in progress. The total footage was 2,898 feet 3 inches. The details of the working of these machines is tabulated below :—

Statement showing the details of Bores

Serial No.	Name of Well Master	Name of Taluka	Name of Village	Diameter of Bore	Depth of Boring	Water before Boring
				Inches		
	Poona District					
1	B. S. Ghogare	Indapur ..	Bawada ..	4″	100′—0″	..
2	,, ,, ...	,, ..	,, ..	4″	150′—0″	..
3	Mahadu Vithoo ..	,, ..	Sarati ..	4″	92′—0″	..
4	Sagajee Abajee	,, ..	Bawada ..	4″	70′—0″	..
5	,, ,, ...	,, ..	,, ..	4″	50′—0″	..
6	,, ,, ...	,, ..	,, ..	4″	30′—0″	..
7	Bajirao Keshavrao ..	,, ..	,, ..	4″	25′—0″	..
8	Nemchand Hirachand ..	,, ..	,, ..	4″	65′—0″	..
9	Shamsudin Malikbhoy ..	,, ..	,, ..	4″	68′—0″	..
10	Rambhawoo H. Tongale ..	,, ..	,, ..	4″	36′—0″	..
11	Rawjee Jijaba Shinde ..	,, ..	Shetfal ..	4″	55′—0″	..
12	D. H. Dhunakle ..	,, ..	Bawada ..	4″	37′—0″	..
13	D. B. Khurad	Haveli ..	Phulgaon ..	4″	50′—0″	..
14	,, ...	,, ..	,, ..	4″	62′—0″	..
15	,, ...	,, ..	,, ..	4″	69′—0″	..
16	,, ...	,, ..	,, ..	4″	50′—0″	..
17	V. B. Marakale	,, ..	,, ..	4″	50′—6″	..
18	G. N. Dhamdhere ..	,, ..	Lonikhand ..	4″	53′—0″	..
19	D. B. Rawool	Sirur ..	Sikrapur ..	4″	57′—6″	..
20	,, ...	,, ..	,, ..	4″	57′—5″	..
21	Harakchand Shamchand ..	,, ..	Talegaon Dhamdhere.	4″	50′—0″	..
22	,, ,, ..	,, ..	,, ..	4″	50′—0″	..
23	R. S. Joshi	Khed ..	Chakan ..	3″	21′—0″	..
24	,, ...	,, ..	,, ..	3″	46′—3″	..
25	Rakhamabai R. Joshi ..	,, ..	,, ..	3″	70′—4″	..
26	D. R. Tapakir	Haveli ..	Charoli ..	3″	40′—0″	..
27	,, ...	,, ..	,, ..	3″	40′—0″	..
28	Anandrao Yeshwantrao Deshmukh.	Khed ..	Chaken ..	3″	37′—0″	..
29	D. Y. Patil	Sirur ..	Shikrapur ..	3″	45′—0″	..
30	Harakchand Shamchand ..	,, ..	Talegaon Dhamdhere.	3″	72′—0″	..
31	K. K. Patil	Haveli ..	Manjri ..	3″	64′—0″	..
32	,, ...	,, ..	,, ..	3″	37′—0″	..
33	Schlecher managing Proprietor Raviwarma Press.	Mawal ..	Malavali ..	3″	50′—0″	..
34	T. M. Jamdade	Purandhar ..	Khalad ..	3″	48′—6″	..
35	,, ...	,, ..	,, ..	3″	66′—6″	..
36	,, ...	,, ..	,, ..	3″	40′—0″	..

taken during the year 1925-26

Water after boring	Departmental charges	Labour charges	Total cost of boring	Cost per foot	Result
	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.	
....	180 8 0	18 12 0	209 4 0	2 1 6	Unsuccessful, completed this year. Previous work done 91'—6".
....	279 7 0	97 8 0	376 15 0	2 8 2	,, ,, ,,
....	16 9 6	82 8 0	99 1 6	1 1 2	Unsuccessful.
....	6 15 6	90 0 0	96 15 6	1 6 2	,,
....	13 15 0	52 8 0	66 7 0	1 5 3	,,
....	19 15 0	30 0 0	49 15 0	1 10 7	,,
200 gallons	26 9 6	22 0 0	48 9 6	1 15 1	Successful.
....	..	101 4 0	101 4 0	1 8 11	Unsuccessful.
....	0 10 0	52 8 0	53 2 0	0 12 6	,,
200 gallons	36 0 0	18 12 0	54 12 0	1 8 4	Successful.
....	1 4 0	86 4 0	87 8 0	1 9 5	Unsuccessful
....	..	..	..	..	On hand.
.....	..	78 12 0	78 12 0	1 9 2	Unsuccessfu .
200 gallons	104 2 0	33 12 0	137 14 0	2 3 7	Successful.
200 ,,	78 8 0	82 8 0	161 0 0	2 5 4	,,
200 ,,	50 0 0	26 4 0	76 4 0	1 8 4	,,
....	..	33 12 0	33 12 0	0 10 8	Unsuccessful.
200 gallons	54 8 0	41 4 0	95 12 0	1 10 11	Successful.
....	..	48 12 0	48 12 0	0 13 7	Unsuccessful.
....	..	75 0 0	75 0 0	1 4 11	,,
200 gallons	50 0 0	26 4 0	76 4 0	1 8 4	Successful.
200 ,,	50 0 0	15 0 0	65 0 0	1 4 9	,,
200 ,,	22 12 6	81 0 0	103 12 6	4 15 0	,,
200 ,,	47 5 0	198 0 0	245 5 0	5 4 11	,,
....	4 2 6	243 0 0	247 2 6	3 8 2	Unsuccessful.
....	..	54 0 0	54 0 0	1 5 7	,,
....	..	45 0 0	45 0 0	1 2 0	Unsuccessful.
....	..	..	..	..	On hand, accident.
200 gallons	32 8 0	127 8 0	160 0 0	3 8 10	Successful.
200 ,,	99 0 0	150 0 0	249 0 0	3 7 4	,,
200 ,,	73 13 9	165 0 0	238 13 9	3 11 8	,,
....	..	..	..	..	On hand, accident.
....	9 13 9	135 0 0	144 13 9	2 14 4	Unsuccessful.
....	..	126 0 0	126 0 0	2 9 6	,,
....	..	117 0 0	117 0 0	1 12 1	,,
....	..	63 0 0	63 0 0	1 9 2	,,

Serial No.	Name of Well Master	Name of Taluka	Name of Village	Diameter of Bore	Depth of Boring	Water before Boring
				Inches		
	Poona District—concld.					
37	T. M. Jamdade	Purandhar ..	Khalad ..	3″	6′—0″	..
38	Alandi Municipality ..	Khed ..	Alandi ..	5″	168′—0″	..
	Sholapur District					
39	Karmala Municipality ..	Karmala ..	Karmala ..	3″	114′—0″	..
40	,, ,, ..	,, ..	,, ..	3″	106′—0″	..
41	N. R. Navale	Sholapur ..	Vinchur ..	3″	64—0″	..
42	N. A Patil	,, ..	Kandalgaon	3″	70′—0″	..
43	R. Deshmukh	,, ..	Malkawat ..	3″	71′—0″	..
44	,, ...	,, ..	Mandarup ..	3″	73′—0″	..
45	G. N. Wagadarikar ..	,, ..	,, ..	3″	51′—0″	..
46	B. W. Shendage ..	,, ..	,, ..	3″	58′—6″	..
47	N. Kadadi	,, ..	Sholapur ..	3″	50′—6″	..
	Ahmednagar District					
48	Mahadoo Sambhoo ..	Shevgaon ..	Avane ..	3″	32′—0″	..
49	,, ,, ...	,, ..	,, ..	3″	21′—0″	..
50	Shankar Ramchandra ..	,, ..	,, ..	3″	22′—0″	..
51	,, ,, ..	,, ..	,, ..	3″	20′—0″	..
52	Surajmal Lalchand ..	,, ..	Bhatkudgaon	3″	55′—0″	..
53	Dada Rajaram	,, ..	,, ..	3″	42′—0″	..
	Pandharpur Implement Society.	Pandharpur	Pandharpur	3″	Three bores 160′—0″	

Water after Boring	Departmental charges	Labour charges	Total cost of boring	Cost per foot	Result
	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.	
....	..	9 0 0	9 0 0	1 8 0	Unsuccessful.
....	..	108 12 0	..	..	,,
200 gallons	146 0 0	414 0 0	560 0 0	4 14 7	Successful, completed this year. Previous work done 64'—0".
....	..	675 0 0	675 0 0	6 5 10	Unsuccessful.
200 gallons	124 7 0	90 0 0	214 7 0	3 5 7	Successful, completed this year. Previous work done 18'—0".
200 ,,	102 1 0	108 0 0	210 1 0	3 0 0	Successful.
200 ,,	139 9 4	90 0 0	229 9 4	3 3 8	,,
....	6 13 3	108 0 0	114 13 3	1 9 2	Unsuccessful.
200 gallons	66 2 0	72 0 0	138 2 0	2 11 4	Successful.
200 ,,	73 7 0	225 0 0	298 7 0	5 1 7	,,
200 ,,	73 1 0	198 0 0	271 1 0	5 5 10	,,
....	..	36 0 0	36 0 0	1 2 0	Unsuccessful.
....	..	27 0 0	27 0 0	1 4 7	,,
200 gallons	22 0 0	18 0 0	40 0 0	1 13 1	Successful.
200 ,,	20 0 0	18 0 0	38 0 0	1 14 5	,,
....	..	90 0 0	90 0 0	1 10 2	Unsuccessful.
....	..	72 0 0	72 0 0	1 11 5	,,
....	..	..	..	..	Successful. The machine was lent to the Implement Society, Pandharpur in November 1924 and taken back on 10th December 1925.

Section IVB

Engineering advice and assistance.—The Mechaincal Assistant looked after the power plants at Manjri, Loni and Kopargaon. Besides this he ren lered help to cultivators for erecting oil engines, power cane crushing mills. The Department lent two power crushers on hire and the hire realised is tabulated below. The power cane crushing plants have commenced to increase and the number has come to 36 from 19 as reported last year.

Description of Power crusher	Place where it worked	No. of days worked during the season	Hire received in Rs.	Area crushed
(1) Chattanooga No. 92	Kolhar ..	56	206 8 0	41½
(2) Ruston Proctor ..	Mamdapur ..	128	400 0 0	90

The Mechanical Assistant prepared eight site plans for pumping, etc., and two new installations were made during the year, one of power cane crusher at Manjri and the other flour and corn mill at Loni School.

Section IVC

Pig-killing campaign.—These operations were conducted in the following ways :—

(*a*) Organisation of hunting parties consisting of Vaidus and dogs and doing the work during day and also by moon light.

(*b*) Use of pig-proof wire fence.

(*c*) Use of poisons as baits for pigs.

(A) A hunting party was organised under a special officer who conducted the campaign during the year. This year the campaign, in addition to the sugarcane area tracts along canals, was conducted in Shevgaon Taluka where rabi jowar is badly affeted by pigs. In Shevgaon Taluka the campaign was a success (*vide* below, the pigs killed). The expenses to be met with these campaigns were contributed partly by cultivators and partly by the Department. In Shevgaon Taluka transport charges of the party were borne by the Department and half cost of maintenance, the rest was met by the cultivators. In the cane areas half the expenses were met by cultivators and half by the Department. The following statement will show the work done during the year :—

Serial No.	Name of place	Month during which the campaign was conducted	Animals killed	Total cost on beaters dogs, ammunitions, etc.	Cost per kill	Remarks
				Rs. a. p.	Rs. a. p.	
1	Mutha Canal	July, August September.	27	82 12 6	3 1 0	The moonlight work (only Gunner's wages and ammunitions cost).

Serial No.	Name of place	Month during which the campaign was conducted	Animals killed	Total cost on beaters dogs, ammunitions, etc.	Cost per kill	Remarks
				Rs. a. p.	Rs. a. p.	
2	Shevgaon ..	October, November and December.	127	1,293 2 6	10 4 8	Partly (of Vaidus, dogs and beaters) was imported from Poona—work in prickly pear.
3	Sinhagad villages.	January ..	17 1 Panther	7 8 0	..	Moonlight work only cost of ammunition, Gunmen and partly was kept in practice).
4	Pravara Left Bank Canal.	February and March	26	370 8 0	14 4 0	Partly from Poona imported—work done in plant and Adsali cane and hence costly.
5	Do. ..	April and May	61	253 11 0	4 2 6	Local party (Vaidus and dogs beaters, etc.). Working on contract—only Gunmen were imported.
6	Pravara Right Bank.	June ..	15	198 4 0	13 3 6	Partly from Poona imported—work done in Reserved Forest area and with the help of Gunmen, Spearsmen and nets.

Note.—(1) The experience so far gained shows that if Beaters and dogs are secured locally the cost will be minimised to a great extent.

(2) The work in Shevgaon has appealed to cultivators so much that there are applications in advance for conducting campaign before the sowing of *shalu-jowar*.

(B) *Use of pig-proof wire fence.*—The work of pig-proof wire fence was completed only recently and its advantage will be watched in the coming year. The fence has been erected in a cultivator's field. The total length is one mile, with a cost of Rs. 2,156 enclosing 22 acres (out of the amount spent over this Rs. 172 erection charges were borne by him). The cost per acre thus comes to Rs. 98. The fence will remain with the cultivator for six years on condition that he has option for purchasing it at the cost price without hire. All repair charges will be borne by him.

(C) *Use of poisons as baits for pigs.*—This method is still in an experimental stage as regards the variety of baits which should be poisoned and hence no work has developed.

The work done up till now in pig-killing campaign has now given sufficient data for publishing a bulletin which work is in the hands of the Agricultural Overseer in charge Pig Campaigns.

Section IVD

This year, there being no fodder famine, there was no demand for fodder produced on Kopargaon Fodder Farm. Only 76 cultivators against 519 of last year took advantage and purchased fodder from Farm.

The following statement gives details of production and disposal on the Farm :—

Serial No.	Name of Fodder	Receipts			Disposal	
		Balance on 1st April 1925	Quantity proudced during the year	Total in lbs.	Sold	
					Quantity	Price
		lbs.	lbs.	lbs.	lbs.	Rs. a. p.
1	Nilva and Jowar Fodder.	247,889	201,079	448,968	144,439	2,455 8 3

Serial No.	Name of Fodder	Disposal				
		Free distribution	Shrinkage in lbs.	Total in lbs.	Balance on 31st March 1926	Fed to Farm Cattle
		lbs.	lbs.	lbs.	lbs.	lbs.
1	Nilva and Jowar Fodder.	*Nil.*	9,667	196,201	252,767	42,095

Section V

Agricultural Education.—The Marathi Agricultural School at Lonikalbhor was run on the same lines. Thirty-two boys were admitted for the first year's course out of a number of 80 applicants. Out of these only 25 remained till the end of the next term. The following statement shows the results of the examination :—

Year	No. of boys in class	No. of boys appeared for examination	No. of boys passed the examination
1st year..	25	25	23
2nd ,, ...	15	15	12

The expenditure of the year amounted to Rs. 15,885-10-0 and the Farm receipts came to Rs. 1,680-4-6.

The training of primary teachers for the agricultural bias schools was conducted and seven teachers from Poona, Satara, Sholapur, Nagar, East Khandesh, Belgaum and Nasik were admitted in the class, who passed the annual examination.

Section VI

Co-ordination of Revenue and Agricultural Officers.—In every district at the time of Jamabandi, meetings arranged by the Collectors or Assistant Collectors, Departmental Staff arranged a small show and gave a talk on important improvements which could be adopted by the cultivators of the place. Besides this the Mamlatdars of each taluka co-operated in

organising and attending the demonstrations held in their respective talukas:

Divisional Board of Agriculture.—The Divisional Board met four times during the year and its chief work consisted of recommending the applications for loans for agricultural improvements and organising the Taluka Development Associations and in carrying out the work of the District Staff of the Agricultural and Co-operative Officers.

The following statement summarises the loans recommended during the last three years.

Year	No. of Societies applying for loans	Total approximate amount recommended by the Board	Total amount sanctioned by the Bank
		Rs.	Rs.
1923-24	1	8,100	2,500
1924-25	41	1,38,185	67,550
1925-26	53	1,11,497	95,700

T. F. MAIN,
Deputy Director of Agriculture,
S. C. D., Poona.

APPENDIX E

Annual Report of the Deputy Director of Agriculture, Southern Division, Dharwar, for the year 1925-1926

Staff and Organisation

(1) I held charge of the office of the Deputy Director of Agriculture, Southern Division, throughout the year and was on tour for 278 days. Mr. Dharwarkar, the Cotton Superintendent, went on study leave to America for one full year and Mr. Shevade, the Superintendent, Dharwar Farm, acted for him. Mr. Apte acted as Superintendent, Dharwar Farm, in place of Mr. Shevade and a new graduate, Mr. D. M. Kulkarni, was entertained in the temporary vacancy caused. Mr. Swadi, the Superintendent, Gokak Farm, went on leave for six months from 7th October 1925 and soon after his return he was transferred to Manjri Farm in the South Central Division. Mr. Neginhal worked as Superintendent of the Gokak Farm in addition to his duty and one Mr. A. S. Patil, a new graduate, has been appointed in the vacancy caused and is being trained under Mr. Neginhal. Mr. G. R. Deshpande returned from his long leave on 7th July 1925 and he was posted to Belgaum as District Agricultural Overseer. The services of Mr. V. S. Kulkarni were lent to the District Agricultural Association for one year under report. Mr. Kurli has been given to the Criminal Tribes Settlement Officer for two years and he left on 10th May 1926. One additional graduate's post sanctioned by the Director of Agriculture for propaganda work in the Southern Division was filled in by Mr. B. S. Patil, a new graduate, from 9th March 1926. Mr. Hulkoti, the Headmaster, Devi-Hosur School, acted as Inspector of Agricultural schools for four months from 1st November 1925 to 1st March 1926 and again from 22nd May 1926 to the end of the year. Mr. Pavate acted as Headmaster during this period. These considerable changes disturbed the work to a certain extent but were unavoidable. All the new men had to be trained to do their duties.

The organisation of the District staff brought about in the year 1923-24 was continued. Mundgod Petha and Halyal Taluka of Karwar District were transferred to my charge from July 1925. The District staff did both propaganda and organisation work.

Season

(2) The ante-monsoon and early monsoon showers were sufficient and all khatif crops were sown in time. Want of rains in August and the first half of September retarded the growth of standing crops and delayed the operation of sowing cotton in the eastern tract. There was attack of grass-hoppers to kharif jowar and that of semilooper (Cosmophial erosa) to cotton crop in the transition tract. Rains during the last week of September improved the situation. Rains in October and November were insufficient to paddy crop and the grain formation was defective. Rabi crops fared badly owing to want of rains in general. The prices of cotton considerably fell and the cultivators especially the

tenants suffered very heavily. The yield and prices both being low, the agricultural season during the year under report was unfavourable Depreciation in the sale and rental value of the lands was an immediate result of the season.

(3) The work done by various sections is summarised under the following heads :—

1. Investigation and experiments,
2. Propaganda,
3. Organisation,
4. Direct services to the public,
5. Agricultural education, and
6. General.

Investigation and Experiments

(4) *Dharwar Farm.*—This farm is rising in importance as a plant breeding station. Cotton and jowar received close attention and groundnut to a certain extent. In cotton, selection in the cross between Dharwar No. 1 × Rosea continued. The cross has yielded two pure strains No. 5 and No. 15 which are superior to Kumpta in yield, ginning percentage and staple. Taking all qualities together, strain No. 15 is better than No. 5. Its seed has been multiplied on Gokak Farm and is ready for distribution in the district. This has got nearly 1 inch staple (0·95″) and it gins 33. In a comparative trial on Dharwar Farm during the year under report it has given 499 lbs. seed cotton per acre against 465 lbs. in the case of strain No. 5 and 403 in the case of Dharwar No. 1. In this attempt to combine the best ginning percentage and staple of the two parents, Mr. Kottur has been able to get a strain possessing a ginning percentage even somewhat higher than Rosea (39 against 36) and a staple as long as that of Dharwar No. 1. The cotton is very fine but the yield is not as good as that of Dharwar No. 1 cotton. This will be tested again during the next year.

(5) Breeding wilt resistent types of cotton received also much attention. The cross between Dharwar No. 1 × Wagale reached its fourth generation. In Dharwar No. 1 × Dharwar No. 2 its third generation. In Dharwar No. 1 × Wagale cross, 3 out of 13 selections were found important and of these three, two were not pure for staple length. Selection of long stapled plants is made in them. One selection No. 10—1 is found to be pure for staple and ten good plants have been selected in this line for further study. The study on Dharwar No. 1 × Dharwar No. 2 cross was on 17 good selections of the last year. Selection No. 6 has given very good results on two plots and is very promosing. It is wilt resistent and is likely to take the place of Dharwar No. 1 cotton. It possesses good white colour in addition to other characters of Dharwar No. 1 cotton. If these results are confirmed during the next season, I think, we shall be in a position to solve the wilt problem of the Kumpta cotton tract.

(6) With the object of isolating (1) a very high ginning strain and (2) a strain possessing a staple longer than one inch, cottons from some parts of India and Burma were obtained and sown by the Cotton Breeder.

Comilla ginning 47·5, Goghari E. 5 ginning 42 and 27 W. N. ginning 40 are decidedly better than Rosea as far as ginning percentage is concerned. As regards staple they do not seem to be of any value. Among three Burma cottons, Wagyi was found to be better than others and a few plants possessing both long staple and high ginning have been selected. It is intended to study these cottons again during the coming season.

(7) Selfing and multiplication of Dharwar No. 1 and Gadag No. 1 cottons on Dharwar Farm continued. Dharwar No. 1 cotton is continuously selfed for the first 12 years and still does not show any deterioration. Mr. Kottur, the Cotton Breeder, is publishing a note on this point.

(8) A comparative ginning trial was conducted on Surat and Platt Brothers hand gins with Dharwar No. 1, Rosea and Gadag No. 1 cotton. Platt Brothers' hand gin leaves less lint on the seed and takes less time to gin than the Surat one. The lint ginned is also better in quality.

(9) Two mutants in cotton have been found by the Cotton Breeder, one in Wagale and the other in Dharwar No. 2. These are only of botanical interest.

(10) In jowar, nine varieties, *viz.* (1) Fulgar yellow, (2) Fulgar white, (3) Bilichagan, (4) Nandyal, (5) Mahisal, (6) Muddinandyal, (7) Chowri, (8) Ambebahar, (9) Handimasadi are maintained pure by selfing. In 1 to 5 selections for high yield has been done and we have two strains in each which yield better than ordinary pure variety. In Muddinandyal, two strains were isolated and tested during the year. Numbers 7 to 9 are mantained for the purpose of study and crossing. Among comparative trials, Nandyal and Bilichagan selections are found promising.

(11) In groundnut, eleven strains selected last year were compared with ordinary unselected seed for yield. Strains Nos. 4, 5, 10, 14 and 15 have given appreciable increase. No. 5 yielding 1,190 lbs. pods per acre, with 19 per cent. increase, tops the list. The number of nuts per plant, percentage of kernals to nuts and weight of kernals seem to be the three important factors which influence the yield. Strains Nos. 4, 5 and 15 which have given better yield are also superior to the ordinary in all these three characters. The selected strains will be tested on a field scale during the next season.

(12) The other important experiments conducted on Dharwar Farm by the Superintendent were :—

Crop Experiments.—The local hard red variety of wheat was compared with four strains of Pivala Kathya, Bansi and Pusa Nos. 4 and 12. Rust appeared but did not spread. The local and Pusa No. 4 are early, while the others are late. Pivala Kathya strains are good yielders of grain. Strain No. 103 gave 877 lbs. grain and 924 lbs. chaff per acre against local wheat 742 lbs. grain and 1,694 lbs. chaff. Spanish peanut variety of groundnut obtained from America by the Director of Agriculture is being multiplied. The yield was 1,936 lbs. with net profits Rs. 80 per acre. The trial of tobacco was successful. The yield

was 901 lbs. and the net profit Rs. 118 per acre. In the garden figs and mangoes received attention.

(13) *Manurial Experiments.*—The heavy dressing of crude night soil in 1914-15 gave good results till the year 1923-24. Those of the last year indicated that the manure was exhausted. This year's results confirm the statement made last year and the experiment will be discontinued next year. The experiment of ploughing in farm yard manure *versus* spreading it on the surface completed its 6th year (three rotational cycles). The net profits per rotation from different treatments are about equal. The local practice of spreading the manure on the surface and simple harrowing for jowar crop and light ploughing without manure to the cotton crop is more convenient. Artificial manures on cotton have slightly increased the yield but have not paid their cost. The results of San green manuring experiment are encouraging and need confirmation.

(14) In addition to the above Dharwar Farm continued to multiply Dharwar No. 1 cotton seed for the Hubli area and developed its mango nursery. Six hundred and forty-two grafts were prepared and sold during the year. Three students took their training in dry farming.

Mr. Apte, the Superintendent of this farm, is devoting adequate attention towards economy and efficiency of the farm.

(15) *Gokak Farm.*—This farm is solving the problems of Gokak canal tract and demonstrates the successful methods of sugarcane and maize cultivation in particular. The fruit garden and the nursery are attracting the attention of the cultivators and this branch of the farm seems to have a great future before it. Among many experiments conducted the following deserve special mention :—(1) Maize with Tur as a row crop has given a net profit of Rs. 105 against maize after maize Rs. 53 per acre. Many cultivators in the canal tract have adopted this. (2) Maize and Tur with poudrette manure has given a record yield of 4,401 lbs. maize and 1,236 lbs. tur with a net profit of Rs. 163 per acre. (3) Maize and Tur top-dressed with groundnut cake (20 lbs. N.) has also yielded a good crop with a net profit of Rs. 117 per acre. (4) Yellow Mauritius cane has succeeded in *karl* soil where Pundia has suffered very badly. The yield is nearly double. This confirms the results of the last year. (5) Top-dressing cane with ammonium sulphate and cake manure in three doses has no extra advantage over giving it once. (6) The application of bone meal to sugarcane crop in addition to cake and ammonium sulphate has not forced the crop to ripen earlier ; nor has the extra cost paid its way. This confirms the results of the last year and the experiment will be discontinued. (7) Cotton and *Rala* in rows has given better results than cotton alone. (8) Sumatra variety of tobacco has given better yield than local as it did during the last year. (9) Lucerne attracted the people very much. It has given 46,634 lbs. yield of green fodder per acre in 1924-1925 and 50,890 lbs. in 1925-26. At the rate of 100 lbs. per rupee, the value comes to Rs. 660 during the last two years. The crop will be maintained for one year more.

(16) The income of the fruit garden was Rs. 1,515 whereas expenditure Rs. 976. The net profit has come to Rs. 539. The income is likely to increase during the coming years.

(17) Gokak farm is a good training ground for cultivators and their sons. An agricultural school here of the type at Devi-hosur has become the demand of the people of the Belgaum District.

(18) *Mugad Rice Breeding Station.*—Ten strains in each of the two varieties of paddy—Mugad and Antersal—were studied intensively. Twenty-five strains in each were under replication. One hundred and sixty-one strains in Mugad and one hundred and forty-two in Antersal were under general study. The intensive study cultures under transplantation fared badly. The drilled replications however grew quite nicely and have given reliable figures. Judged on the basis of average collective yield the selected early types show appreciable superiority over the early check plots. Among the intermediate types there is some improvement in Antersal cultures and among the late types Mugad cultures show some improvement. Seven strains in Mugad and six in Antersal have been given out for trial on a field scale. The work on *Gonag* is being continued.

(19) *Tegur Cattle Breeding Farm.*—The season for cattle was good. 120,000 lbs. hay was prepared and 20,150 lbs. chaff, 29,050 lbs. Kadbi and 4,000 lbs. paddy grass were grown on the farm. Water supply for drinking in the hot weather was not adequate and the well had to be deepened.

Seven bull and twelve cow-calves were born and four bull-calves and one old cow with its calf were sold during the year. The total number of cattle on 31st March 1926 was 135 valued at Rs. 5,942. The bull-calves bred on Tegur farm have attracted the attention of the cultivators and are fetching better prices than the local ones. Sheep breeding on Tegur farm has not been thriving. Fourteen were born but eleven died during the year. The total number of sheep as it stood on 31st March 1926 was 51 valued at Rs. 510.

(20) *Experiments in Cultivators' fields.*—The District staff conducted a number of experiments in cultivators' fields and demonstrated them where successful. The important among them were :—

1. Trial of jowar varieties selected on Dharwar farm—Savaner, Bilichagan, Fulgar Yellow, Fulgar white, Mahisal, Nandyal and local. Bilichagan variety is generally appreciated by cultivators in fields affected with striga. In Bailhongal Division Nandyal has given the best yield and in Gadag Division Savaner.

2. Dharwar No. 1, Gadag No. 1 and the new cross Dharwar No. IX Rosea cottons were tried in various places. Dharwar No. 1 cotton is taking hold in Bijapur District. There was some doubt as regards yield of Gadag No. 1 against Dharwar American cotton. In all the three experiments conducted at Mulgund, Hulkoti and Kurtkoti, Gadag No. 1 has given better yield than Dharwar-American

cotton and the doubt has been removed from the minds of many cultivators. The new cross has given exceedingly good results at Murgod in Bailhongal Division—652 lbs. against 572 lbs. of Dharwar No. 1 and 382 lbs. of Kumpta per acre.

3. Spanish-peanut variety of groundnut was tried in various places and its cultivation is largely extended. The seed multiplication work is being undertaken on Dharwar Farm.

4. Wheat varieties—Pusa Nos. 4 and 12, Bansi and Local were tried in 4 places. At Bagewadi, the results of Pusa wheats are very encouraging. Pusa No. 12 gave 640 lbs. and No. 4, 448 lbs. against 256 lbs. Bansi, and 208 lbs. local per acre.

5. Experiments with application of bone-meal before sowing and top-dressing cake manure to paddy crop continued and they have given encouraging results. The use of these two manures is gradually spreading.

6. Ammonium sulphate to cane crop is no more an experiment. Mallad cultivators also are taking to it. An experiment conducted at Mundgod is also very encouraging.

7. Sodium Nitrate to Onion crop has given very good results at Akkur (9,520 lbs. yield per acre against 5,820 lbs. in the check plot).

8. Top-dressing cake manure to cotton crop has given favourable results in one experiment and unfavourable in two. The experiment will be repeated in some paces during the coming season.

Propaganda

(21) *District cotton work.*—The cotton staff attended to the work of multiplying Dharwar No. 1 and Gadag No. 1 cotton seed round Hubli and Gadag respectively in their various generations. The seed was sown under supervision and the standing crop was inspected from time to time. The produce was collected, was sold through the Cotton Sale societies and was ginned separately under careful supervision. The seed thus obtained was cleaned and stocked in the society's godowns for distribution during the coming season. The magnitude of work done under this head is summarised in the following statement :—

Name of the variety	Generation	Quantity of seed distributed	Area sown	Quantity of produce obtained	Quantity of seed stocked for distribution during the coming year
		Lbs.	Acres	Dokras	Lbs.
Dharwar No. 1 ..	4th ..	11,060	1,070	679	167,196
Do. ..	5th ..	82,965	9,535	5,174	903,692
Gadag No. 1 ..	3rd ..	255	28	36	7,454
Do. ..	4th ..	5,260	535	240	50,000
Do. ..	5th ..	43,118	4,078	3,228	750,000

(22) For distribution of general seed stocked last year, the officers of the Agricultural Department and the Sale societies worked together and started several depots in addition to the existing seed societies. The seed at sowing time having gone cheaper than what it was bought for, the distribution work became rather difficult. Both Hubli and Gadag Sale societies started each 19 sale depots and distributed 954,698 lbs. Dharwar No. 1 and 404,394 lbs. Gadag No. 1 good cotton seeds of known origin respectively. In addition to the above, Sardar Mahaboobalikhan stocked and distributed 200,000 lbs. Dharwar No. 1 cotton seed and Dalals' Association 150,000 lbs. Dharwar No. 1 cotton seed of fairly good quality. The quantity of seed distributed by various local merchants in Hubli and Gadag markets cannot properly be estimated. The estimated areas in acres under these two cottons controlled and uncontrolled are tabulated below :—

Name of variety	Area controlled by cotton staff	Area controlled by the societies	Area uncontrolled—bazar seed	Total
Dharwar No. 1 ..	10,605	89,395	19,532	119,532
Gadag No. 1 ..	4,642	55,758	37,000	97,400

Distribution of Dharwar No. 1 cotton seed in Belgaum and Bijapur Districts was limited to a few villages in Athani, Chikodi and Gokak Talukas of the Belgaum District, and a few villages of Indi, Bijapur, Bagalkot and Bagewadi Talukas of the Bijapur District. The extra profits realised by cultivators during the year are estimated to be Rs. 8,57,000.

(23) The important work done by the Cotton staff was grading in auction sales of various cotton sale societies. In all 13,260 dokras of Dharwar No. 1 and 11, 151 dokras of Gadag No. 1 cottons were graded and 31,349 dokras were sold by private treaty. Grading work and auction sales are bringing in better prices to the cultivators.

(24) *Cotton Transport Act.*—Licenses were issued to the cultivators of Nizam's dominions and Madras Presidency bordering Gadag to bring in their cotton to Gadag market subject to inspection for sale and to the cultivators of Haveri and Ranebennur talukas for importing cotton seed from Davangeri for feeding purposes. The Transport Act has very much improved the quality of cotton in the protected areas.

(25) *Demonstrations of improved implements.*—A series of demonstrations were arranged during the year in all the quarters of the Division and special attention was given to the circular chaff-cutter. The hand circular chaff-cutter is not freely being taken to by the cultivators as the work is rather heavy and the price too much to an ordinary cultivator to buy. The demonstrations of bullock-gear chaff-cutter were appreciated by the cultivators and will be extended during the coming season. Demonstration of iron ploughs is no more a need. The use of the

wheat-thresher with twelve discs is gradually extending and that of the stone-roller is fast extending. The demand for Nahan mill has increased and Messrs. Kirloskar Brothers are now manufacturing mills of Nahan type which they have named Kisan mills. The special feature of the year was the demonstration of Messrs. Macbeth Brothers' Motor tractor plough at Yamanur, Gadag, Navalgund and Dharwar. This tractor plough has been much appreciated by the cultivators and big landlords and it is likely that there will be demand during the coming season.

(26) Agricultural conferences combined with Cattle Shows were arranged at Yamanur and Chinchali where people from all over the Division meet and a good many useful subjects were discussed for two days in each place.

(27) *Propaganda against smut.*—This was mainly done through the Revenue Authorities and was done on a larger scale than in two previous years. The Rabi season however in Bijapur District was not favourable and some packets remained undistributed. The total number of packets distributed during the year was 32,130 (Dharwar District 20,366; Belgaum District, 5,580 and Bijapur District 6,184).

(28) The general propaganda described in paragraph 34 of the last year's annual report continued with good results.

Organisation

(29) *Seed, Implement and Manure societies.*—No attempts were made to start small new societies. Co-operative cotton seed distribution was organised through cotton sale societies by starting seed depots in several places (*vide* paragraph 22) and through existing Seed societies in Dharwar District and through Taluka Development Associations in Bijapur and Belgaum Districts. The business done by societies in hiring out iron ploughs during the year is again very little. The prices of iron ploughs have continued to be low and the cultivators prefer purchasing them. Attempts are being made to increase the share capital of various societies and induce them to sell these iron ploughs on commission. As regards the use of artificial manure, there is not much scope in the dry tract. In Chikodi taluka of the Belgaum District, Kabbur Manure society sold 6 bags Ammonium Sulphate and 40 bags of groundnut cake. One good centre for each taluka for supply of all Agricultural requisites with adequate staff is, I think, what is needed rather than too many small independent societies which cannot maintain well paid managers to run them.

(30) *Sale societies.*—Cotton Sale societies except Annigeri and Bagalkot are thriving well in my Division and part of their work done is described in paragraph 22. Hubli Sale society continued to prosper under Rao Saheb Shirhatti's management. Gadag Sale society with all the boycott from the local Dalals and merchants, did good business. Haveri, Bailhongal and Bijapur Sale societies are also trying their best to develop

their work. The following statement summarises the work done by the various societies :—

Serial No.	Name of society	Number of members	Share capital	Number of dokras sold	Value of cotton sold
					Rs.
1	Dharwar	212	3,605	1,100	57,000
2	Hubli	2,262	14,451	18,606	8,56,321
3	Gadag	1,513	41,978	20,237	9,89,539
4	Annigeri	154	2,066	798	28,000
5	Bagalkot	221	4,655	1,924	1,34,507
6	Bijapur	113	2,240	341	14,000
7	Haveri	554	6,510	4,852	1,99,255
8	Bailhongal	214	2,750	6,643	2,65,645
		5,243	78,255	54,501	25,44,267

(31) The Chilli Sale society at Byadgi sold 12,53,440 lbs. produce worth Rs. 2,19,834 and has realised a net profit of Rs. 6,236 against Rs. 921 last year. The credit is largely due to Mr. Rammanna Betgeri, the new Managing Director.

(32) The Nipani Tabacco Sale society sold 56,640 lbs. produce worth Rs. 19,639 and realised a net profit of Rs. 2,058. This society is not doing much good work. Co-operative local jarada making centres are what are needed.

(33) *Cattle Breeding societies.*—These are making fairly good progress especially in Hangal and Hirekerur talukas of the Dharwar District. Shidenur Cattle Breeding society deserves special mention. Premium bulls were supplied to Bhogavi, Kachavi and Havasbhavi societies.

(34) *Fencing societies.*—Dhumwad, Kurankop, Birwalli, Bendalgatti and Astgatti societies' stone walls have fallen in some places and need repairs. The height of the wall where below 5′ needs raising. The need of strict supervision at the time of construction is being much felt. With all their existing defects these stone walls have been very useful to the cultivators. Estimation of extra profits already realised amount to more than the original cost of construction. Nelliharvi and Hungund societies built their walls during the year, but Bommigatti and Tavargeri societies have not done it as yet. Tadas, Nandikatta and Arbhavi schemes are mature and papers for registration of these societies will be sent soon. A new scheme at Kelgeri is taken up. Those at Tegur, Kittur and Bidi have still difficulties to be solved.

(35) Campaign of removing prickly pear against pig in Mundargi Petha with the help of the Deputy Collector, III Division, Dharwar, continued during the year. The advantages derived are very great when compared to the amount of money spent on this work. A separate note is being prepared on the subject.

(36) *Other Land Development societies.*—Yelvigi Waddars' Joint Cultivation society was registered during the year, and work is commenced. Lands to Maharajpeth Joint Cultivation society have not yet been given.

Investigation regarding the damage done to Mango joint cultivation society is still in progress. One Mr. Robinson has agreed to give water to Adibatti village lands in Gokak Taluka by pumping it from the river Ghataprabha and organisation of an Irrigation society for distribution of water is being worked out in that village.

(37) *Taluka Development Associations.*—Two new such associations were organised and registered during the year, one at Haveri and the other at Bijapur. The Haveri Association has collected an amount of Rs. 7,000 with the help of the popular Mamlatdar, Mr. Hyammannavar, and the members are keen on agricultural improvement of their taluka. The existing Bijapur Association was converted into Taluka Development Association with some additional subscriptions. There are now eleven Taluka Development Associations in my Division. Associations for Bailhongal, Murgod, Shindgi and Navalgund are being attempted and the first two of these are nearly worked out. Funds for these Associations is a matter of much importance and I repeat my proposals made in paragraph 44 of my last year's annual report.

(38) *The District Agricultural Association, Dharwar.*—Mr. V. S. Kulkarni, a senior Agricultural graduate of the Department, was lent by the Director of Agriculture to this Association during the year under report. He improved the tone of the magazine and conducted a few experiments and demonstrations in members' fields. Spraying potato crop with lime sulphur wash against mites and demonstrations of the circular chaff-cutter and the motor tractor plough were important among them. The Association is collecting exhibits for the Poona Show. This Association sold implements worth Rs. 2,807 and realised a net profit of Rs. 270 on the same. The hire proceeds have amounted to only Rs. 176. With a view to work with the Taluka Development Associations and Co-operative societies this Association has submitted a scheme to Government which is under consideration.

(39) The Divisional Board held its quarterly meetings very regularly. Many important subjects were discussed in these meetings and the proceedings were submitted to the Joint Board. Diaries of the District staff and programme of work were also discussed and suggestions were made. The Deputy Director of Agriculture, S. D., Dharwar, was the Chairman of the Board.

(40) *The Officers' Divisional Conference.*—This was held in the month of May 1926 when subjects concerning investigation, experiments, propaganda and organisation were freely discussed and programme of important work was outlined.

Direct services to the Public

(41) *Field Embankment.*—The special Bunding Officer prepared in all sixty-seven schemes during the year. Seventeen schemes costing Rs. 18,000 were prepared for the land owners who were able to execute them with their own capital and the other fifty schemes in thirteen villages of the Bijapur District depended upon tagavi loan. In addition to the above works, more than fifty fields were inspected for general advice on additions or alterations of the cultivators' existing bunds. Demand

for this service has very much increased and cannot adequately be met. The Agricultural Overseers in Bijapur District worked with the Special Officer and are picking up this work. A note together with my proposals for extension of this work has been submitted to the Director of Agriculture who has been kind enough to send it to Government and action is awaited. The Collector of Bijapur, Mr. Naik, is very much interested in this field embankment work and is issuing takavi loans freely for the purpose. Two Cooperative bunding schemes are being attempted, one at Shirur and the other at Hallikeri.

(42) *Boring.*—All the five machines continued to work. In all thirty-nine bores were taken—ten at Kurtkoti, nine at Savanur, five at Hubli, five at Chachadi, nine at Akol and one at Bijapur. Out of these thirty-one were successful, four failures, three incomplete and one rejected. The total work done during the year was better than that of the last year but receipts were less owing to reduction of rates. The total depth bored was 3,561′ 3″ against 2,499′ 11″ last year and the total receipts amounted to Rs. 4,389-7-0 against Rs. 4,911-14-6. The details of each bore are given in Appendix A.

Six pumps were fitted on surface bores and charges of Rs. 60-7-0 were credited to the Treasury. One mechanic has been trained for the District Local Board machine. The work of Local Board and Taluka Development Associations' boring machines was occasionally inspected and necessary advice given. The demand for boring machines in the Southern Division has greatly increased and many applications had to be rejected.

(43) *The work of the Mechanical Assistant.*—He inspected in all sixteen pumping sites for fourteen persons during the year and has prepared plans and estimates. He repaired the pumping plants in three places—Yerdal, Neginhal and Ankli—the charges Rs. 35 have been credited to the Treasury. He attended to all the machinery in different farms including Bankapur.

(44) *Karajgi Baling Plant.*—10,395½ Kats of kadabi worth Rs. 10,000 was purchased during the year and 16,610 bales (13,59,762 lbs.) have been pressed. The machine this year worked better than last year but by no means satisfactorily. There were many breakdowns and the shredding machine worked only on one drum during the last month of the season. Out of these, 16,610 bales pressed during the year, 5,000 could be accommodated in the tin shed where 5,282 bales pressed last year were already stored. The remaining have been stacked outside and thatched with bamboo mattings and tur stalks against rains.

(45) Takavi loan applications amounting to in all Rs. 1,51,800 (Rs. 98,500 in Dharwar District, Rs. 51,300 in Belgaum District and Rs. 2,000 in Bijapur District) for land improvement were dealt with. Various sites were inspected and estimates of schemes prepared before they were recommended.

(46) *Agricultural Education.*— The Agricultural School at Devi-hosur completed its twelfth year and during this whole period 123 students

have passed out. Seventy applications were received for admission during the year and out of these thirteen students were successful candidates in the Vernacular School Final Examination.

This shows the increasing popularity of the school. Sixteen students were selected but one fell ill and left the school at the end of the first term. Fifteen students in the first year and eleven students in the second year received education during the year. Besides, eight teachers for agricultural-bias-schools received their training. All these were occasionally taken on tour to different tracts to study various subjects which could not properly be taught at Devi-hosur. Mr. Hulkoti, the Head Master of the school, went as Inspector of Agricultural Schools twice during the year. Due to his absence for five months from the school and due to the prevalence of plague at Devi-hosur for some three months, the education of the students was slightly disturbed. Mr. Pavate, the acting Head Master, however, did his best to meet the situation and worked hard.

Four new agricultural-bias-schools were opened during the year—two in Dharwar District at Hosritti and Haunsbhavi, one in Bijapur District at Almel and one in Kanara District at Tergaon. The demand for agricultural education is increasing. Belgaum and Bijapur District Local Boards have moved for agricultural schools of the type at Devihosur—one for each District. The Belgaum District Local Board sent five teachers for training during the year and is proposing to send another five for the next year.

General

(47) It is gratifying to note that our propaganda and organisation are awakening the people and their demand for advice and help has very much increased. The extra profits derived by the cultivators from various improvements introduced are calculated to be immense when compared to the expenditure incurred. The staff in general except two or three has done good work though of course I expected more organisation work from the District staff.

(48) Many Revenue Officers and private gentlemen continued to help our propaganda and organisation work and my thanks are due to them. In response to Government Resolution, Revenue Department, No. 1801-24, dated 2nd July 1925, attempts were made to co-ordinate the work of the Revenue and Agricultural Departments by holding special training classes of the village officers in eight places. The Director of Agriculture was approached for a special grant of Rs. 500 for expenditure in connection with demonstrations and refreshments to village officers which he was kind enough to grant. Mr. Acott, the Collector of Dharwar, Mr. G. A. Hiremath, the Deputy Collector, II Division, Belgaum, Rao Bahadur Mudbidri, the Deputy Collector, III Division, Dharwar, Mr. Harpanhalli, the Mamlatdar of Dharwar, Mr. Benni, the Mamlatdar of Navalgund, and Mr. Hyammannavar, the Mamlatdar of Haveri, took keen interest in organising these classes. Myself and the District Agricultural Overseers actually trained the village officers in advising the cultivators to

adopt the main improvements effected by the Agricultural Department and suited to different tracts. About 400 village officers have thus been trained to do our work in their respective villages and I hope this propaganda through village officers will bear its fruit.

(49) In conclusion I am glad to make a mention that the Honourable Mr. Ali Muhammad Khan Dehlavi, Bar.-at-Law, J. P., Minister for Agriculture and Co-operation, visited Bijapur and discussed many important agricultural problems of the Bijapur District during his stay there for 2nd to 4th September 1925 and interviewed the leading agriculturists and landlords of the District. The Honourable Sir Ibrahim Rahimatoola, K.C.S.I., C.I.E., J.P., President, Bombay Legislative Council, paid a visit to Dharwar farm on 20th June 1926 and went over the work of the Division arranged in different sections. He also interviewed the members of the District Agricultural Association, Dharwar.

The visits of these two distinguished officers were very encouragin

S. S. SALIMATH,
Deputy Director of Agriculture, S. D.,
Dharwar.

DETAILED STATEMENT OF BORING WORK DONE IN THE SOUTHERN DIVISION FOR THE YEAR 1925-26.

MO.Q 35—6a

Detailed Statement of the Boring work done in

Serial No.	Name of Owner	Name of Taluka	Name of Village	Dia of bore Inches	Depth of Boring	Water before boring in gallons per hour
	Dharwar District					
1	Mr. Rangacharya ..	Savanur ..	Savanur ..	3″	156′—0″	Surface ..
2	„ Subbanna Naik ..	„ ..	„ ..	3″	100′—6″	„
3	„ Bhimappa Basappa ..	„ ..	„ ..	3″	43′—0″	„
4	„ Abdullakha	„ ..	„ ..	3″	54′—6″	Well 250
5	„ Tirakappa Doddmani ..	„ ..	„ ..	3″	93′—0″	„ 200
6	Fakira Gowda ..	„ ..	„ ..	3″	132′—0″	„ 200
7	„ Abdul Satar Baig ..	„ ..	„ ..	3″	80′—3″	„ 100
8	„ Sultansaheb ..	„ ..	„ ..	3″	31′—0″	„ 100
9	„ Vajiralli	„ ..	„ ..	3″	77′—6″	Surface ..
10	„ Mailargowda Patili ..	Gadag ..	Kurt Koti ..	3″	64′—0″	„
11	„ „ „ ..	„ ..	„ ..	3″	134′—0″	„
12	„ Dattatrya Krishna ..	„ ..	„ ..	3″	75′—0″	Well *nil.*
13	„ Martand-Gowda ..	„ ..	„ ..	3″	54′—0″	„ „
14	„ Guranath Khandu ..	„ ..	„ ..	3″	19′—0″	„ „
15	„ „ „ ..	„ ..	„ ..	3″	60′—0″	„ „
16	„ Fakirappa	„ ..	„ ..	3″	120′—0″	Surface
17	„ Vishtappa Patil ..	„ ..	„ ..	3″	75′—0″	„
18	„ Gurunath Kasinath ..	„ ..	„ ..	3″	138′—0″	„
19	„ Shivappa Patil ..	„ ..	„ ..	3″	125′—0″	„
20	„ Jivraj Chapsi ..	Hubli ..	Hubli ..	3″	200′—0″	„
21	„ Hirji Punji	„ ..	„ ..	3″	200′—0″	„
22	„ L. B. Pinto	„ ..	„ ..	3″	135′—0″	„
23	„ Braganza	„ ..	„ ..	3″	190′—0″	„
24	„ Mulji Semji	„ ..	„ ..	3″	213′—0″	„
	Bijapur District					
25	Mr. Sabhapali & Co. ..	Bijapur ..	Bijapur ..	3″	50′—0″	Well *Nil.*
	Belgaum District					
26	Sirdar V. G. Desai Bore No. 4	Bail-Hongal ..	Chachadi ..	4″	49′—6″	Well *Nil.*
27	„ „ „ No. 5	„ ..	„ ..	4″	101′—0″	„
28	„ „ „ No. 6	„ ..	„ ..	4″	171′—0″	Surface
29	„ „ „ No. 7	„ ..	„ ..	4″	38′—0″	Well 60..
30	Dr. Kittoor	Augol ..	Konevali ..	4″	64′—0″	„ *nil.*
31	Mr. Bhaichand Gujjar ..	Chikodi ..	Akol ..	4″	71′—0″	Surface ..
32	„ G. S. Kulkarni ..	„ ..	„ ..	4″	69′—6″	„
33	Sanitary Committee No. 1 ..	„ ..	„ ..	4″	63′—6″	„
34	„ „ No. 2 ..	„ ..	„ ..	4″	70′—0″	„

Southern Division for the year 1925-26

Water after boring in gallons per hour	Department charges	Labour charges	Coal and fuel for Engine	Total cost of boring	Cost per foot	Result
	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.	
230	209 0 0	146 13 0	4 3 0	360 0 0	2 5 0	Successful.
200	125 12 0	99 0 0	3 2 0	227 14 0	2 4 0	„
200	43 0 0	38 8 0	7 4 0	88 12 0	2 1 0	„
700	56 12 0	80 0 0	8 0 0	144 12 0	2 10 0	„
1,000	114 8 0	65 13 0	12 0 0	192 5 0	2 1 0	„
1,600	173 0 0	55 11 0	6 0 0	234 11 0	1 11 0	„
800	95 6 0	108 0 0	10 0 0	213 6 0	2 11 0	„
1,000	31 0 0	50 0 0	3 0 0	84 0 0	2 11 0	„
....	....	.....	....	....	....	In progress.
250	119 0 0	75 0 0	4 0 0	198 0 0	3 2 0	Successful.
100	163 8 0	100 0 0	5 8 0	269 0 0	2 0 0	„
225	143 12 0	87 8 0	3 8 0	234 12 0	3 2 6	„
260	96 8 0	53 0 0	2 8 0	152 0 0	2 13 6	„
250	33 4 0	43 6 0	2 8 0	79 2 0	4 3 0	„
240	5 0 0	91 14 0	3 2 0	160 0 0	2 11 0	„
200	155 0 0	83 2 0	4 8 0	242 10 0	2 0 0	„
250	87 8 0	120 0 0	8 0 0	215 8 0	2 14 0	„
200	182 0 0	149 6 0	5 0 0	336 6 0	2 7 0	„
30	73 12 0	175 0 0	5 8 0	254 4 0	2 3 6	Failure.
300	275 0 0	186 0 0	5 0 0	466 0 0	2 5 0	Successful.
190	275 0 0	247 0 0	8 0 0	530 0 0	2 10 6	„
200	177 8 0	193 12 0	7 0 0	378 4 0	2 11 6	„
175	260 0 0	336 14 0	10 0 0	606 14 0	3 3 0	„
....	....	....	....	....	....	In progress.
100	50 0 0	....	....	....	....	3'—6" work was done in this year.
....	74 4 0	48 0 0	37 8 0	159 12 0	3 4 0	Failure.
350	253 4 0	108 0 0	65 0 0	426 4 0	4 4 0	Successful.
200	231 8 0	167 8 0	155 0 0	554 0 0	3 4 0	„
600	55 11 0	30 0 0	25 8 0	111 3 0	2 15 0	„
....	....	....	....	....	....	In progress.
70	170 4 0	30 0 0	22 0 0	222 4 0	3 2 0	
200	166 2 0	65 0 0	38 0 0	269 2 0	3 14 0	Successful.
250	70 4 0	45 0 0	21 2 0	136 6 0	2 2 6	„
60	80 0 0	47 8 0	27 8 0	155 0 0	2 3 6	„

Serial No.	Name of Owner	Name of Taluka	Name of Village	Dia of bore Inches	Depth of Boring	Water before boring in gallons per hour
35	Mr. Balgowda	Chikodi ..	Akol ..	4"	52'—0"	Surface.
36	,, Bhima Babaji Patil ..	,, ..	,, ..	4"	75'—0"	,,
37	,, Sidlinga Nijlinga ..	,, ..	,, ..	4"	86'—0"	,,
38	,, Sanitary Committee No. 3	,, ..	,, ..	4"	64'—0"	,,
39	,, Sultan Baig	,, ..	,, ..	4"	65'—0"	,,

Water after boring in gallons per hour	Department charges	Labour charges	Coal and fuel for Engine	Total cost of Boring	Cost per foot	Result
	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.	
....	....	....	....	....	....	Rejected owing to accident.
160	87 8 0	70 0 0	53 8 0	211 0 0	2 13 0	Successful.
55	52 0 0	80 0 0	55 0 0	187 0 0	2 3 0	Failure.
250	71 0 0	52 0 0	63 14 0	186 14 0	2 15 0	Successful.
150	12 8 0	48 0 0	62 14 0	110 14 0	1 11 6	„

APPENDIX F

Summary of Work done under the Deputy Director of Agriculture, Gujarat, Surat, for the Year 1925-26

I. Staff

I was in charge of the Division throughout the year.

2. Mr. C. S. Patel held the post of Cotton Superintendent, during the year, except from 8th April to 18th June 1926, when he acted for Mr. V. G. Gokhale, Deputy Director of Agriculture, Konkan, and Mr. G. P. Pathak acted as Cotton Superintendent, during the period.

3. Mr. Gulabbhai N. Desai, Divisional Superintendent of Agriculture, N. D., Ahmedabad, was on leave for one year on medical certificate from 1st July 1925 and Mr. Khandubhai B. Naik acted for him.

4. The services of Mr. K. D. Naik were lent to the Indian Central Cotton Committee for four months from 11th February 1926 to 11th June 1926 for special work of enquiring into the finance of cotton crop in Upper Gujarat.

II. Research and Experimental Work

(1) *Research on Crops*

5. *Cotton at Surat.*—The promising segregate 1027 Surat 5[1] gave an increase of about 90 lbs. in yield, 3·8 in ginning percentage and in valuation Rs. 10 more per khandi; but is inferior in point of length of staple by 0·03 to 0·01 and further the spinning tests of this segregate are not encouraging as compared with the original 1027 A.L.F.

Further study in Broach-Deshi strains and the detailed work on crosses will be shortly published.

6. *Cotton at Broach.*—The yield of I A Broach 9[1] was slightly superior to that of Broach Local; but the increase of 3·7 in ginning percentage and 0·11 inch in length of staple was a decided gain. On the whole this strain is valued at Rs. 55 to Rs. 60 per khandi more than the local.

The spinning value of this strain is also superior to Local by 6 counts. It will not be too much to say that after several years' trial the Department has succeeded in evolving a strain that will suit the requirements of the whole Broach tract. Every effort is being made to multiply the seed of this strain for distribution in the district.

7. *Cotton at Viramgam.*—All the four strains of Wagad Pts. 14, 12, 8 and 4 bred true to the characters as observed in previous years and are superior to Local Wagad. Of the four only two strains, Nos. 4 and 8, are to be retained and every effort is being made to multiply their seeds for distribution in the tract. About 150 to 200 acres will be under these two strains during the year 1926-27.

8. *Jowar at Surat.*—The strain Althan Deshi 6 yielded 147 to 230 lbs. more per acre than the strain Moni-Timberva 7 or the Local. Hence it is decided to multiply Althan Deshi 6 as a better yielder on a large scale for distribution.

9. *Jowar at Broach* —Out of 6 promising strains, Nos. 10, 12, 5 and 8 which appeared better will be tried in the district as well as on the farm for further verification.

10. *Tobacco at Nadiad.*—The study of economical characters and propagation of the selfed seed of 11 segregates of the Local varieties was continued. The comparison of each of the 4 improved strains, Nos. 6, 20, 22 and 30, showed an increase over the respective Local varieties, viz., Gandiu, Movadiu, Shengiu and Piliu, by 12·8, 14·2, 18·7 and 7·9 per cent., respectively. The first two strains, *i.e.*, Nos. 6 and 20, were also tried in the district which showed superiority over their respective locals by 8·4 to 38·0 per cent. in yield during the year. Gandiu Selection No. 6 has proved to be superior both on the farm and in the district. Hence it is decided to grow it on 1¼ acre every year which will yield enough seed to suffice for 1,000 acres in the district according to a definite plan which will replace the Local Gandiu type with this improved type in a few years in the greater part of Charotar. Selections have also been made this year from the Local Tobaccoes grown in Ahmedabad, Broach, Southern Maratha Country and also Dharmaj side for getting pure strains for those localities. Thus the Nadiad Tobacco Research Station will be a breeding centre for the Tobacco crop of the whole Bombay Presidency.

An effort is also made to evolve a type suitable for cigarettes for the Indian Market.

It is also decided to try some of the exotic varieties for securing strains for high yield and quick growing for crossing with the Locals.

(2) *Experimental Station Work*

11. (*a*) *Surat Agricultural Station—Cotton.*— On the farm 67 acres and 2¾ gunthas were sown with pure selected seed of 1027 A. L. F., supplied by the Cotton Breeder, South Gujarat, Surat. The average yield of seed cotton per acre was 404 lbs. as against 284 lbs. in the surrounding Athwa group villages, as the season was bad for cotton. The cotton seed obtained from the farm produce ginned on the farm was distributed to selected villages in different groups for further multiplication and distribution in those groups. This will save a lot of cartage and freight charges on the seed that was up till now being sent from the Athwa group to the other groups for distribution.

12. *Jowar.*—The area under jowar on the farm was 56 acres and 30 gunthas with an average yield of 867 lbs. as against 750 lbs. in the villages round about the farm.

13. *Ridging Experiment No. I.*—This was continued on the same lines as those of the previous years to see the after-effects of manure. Even

though the year was a dry one the yield is still higher as compared with the average of the farm.

Ridge Experiment No. II.—The Experiment has finished two cycles of Cotton-Jowar rotation. The average results so far obtained are encouraging. In cotton, ridging with 10 tons F. Y. M. per acre in trenches gave an increase of 46 per cent. over flat; while ridging alone with deep and shallow intertillage gave 23 per cent. and 12 per cent. more over the flat respectively.

In jowar, ridging with 10 tons F. Y. M. per acre in trenches gave an average increase of 51 per cent. in grain and 59 per cent. in fodder; while ridging with deep and shallow intertillage gave 28 per cent. and 12 per cent. more in grains respectively over the flat.

In order to confirm the above results more fully the experiment will be continued at least for one cycle, *i.e.*, two years more.

Ridge Experiment No. III.—The experiment was run on the same lines for the last two seasons using Castor Cake as nitrogenous top-dressing to both the crops, cotton and jowar. The year under report is the 3rd year for the experiment. It will be seen from the average results of the three seasons that ridging with 10 tons F. Y. M. per acre applied in trenches in alternate years and 4 cwts. Castor Cake per acre as top-dressing every year showed an increase of 42·8 per cent. over flat in case of cotton and in case of jowar 74 per cent. in grain and 10 per cent. in fodder over the flat. In case of cotton, Castor Cake when applied alone as top-dressing did not help in increasing the yield, but in the case of jowar the increase was 28 per cent. in grain and 55 per cent. in fodder.

14. Every trial is being made to extend the Ridge Cultivation System in the district and also outside. It is extending in the water-logged villages of the Olpad Taluka and the adjoining tract of the Baroda State. All the ridging implements available on the farm were lent to the cultivators, but the demand was so great that many went back disappointed.

15. *Breeding Herd.*—A herd of pure Kankrej Breed has been maintained for nearly 25 years or so, to increase the milk yield of this breed by selection and for supplying the best pedigree bulls into the Surat and Broach Districts for improving the local breed which has of late much deteriorated.

The strength of the herd on the 1st April 1926 was 112 as against 130 of last year as some of the animals had to be sold off by auction sale for want of accommodation.

The total milk yield was 70,448 lbs. of 26 cows against 82,234 lbs. 12 ozs. of last year of 38 cows with an average yield of 2,561 lbs. per cow against 2,542 lbs. of the last year, after deducting that of the newly calved and old animals. The performance of the animals in the herd has been the same as reported in previous years.

16. During the year under report ten premium bulls were distributed in the district. There is still a very big demand for the bulls, but it is not possible to give more than ten with the present strength of the herd.

17. (*b*) *Broach Farm.*—A very small area of this farm is reserved for cotton and jowar breeding work, for growing crosses and strains for comparison and multiplication of seed, the rest being leased out to a cultivator on condition to grow the seed supplied by the Department for multiplying the seed.

18. (*c*) *Dohad Farm.*—The same work of selection in Maize, Wheat and Gram was continued.

Mass-selected detasselled seed has given better results in Maize.

Multiplication of seed of the promising selected strains was continued.

Out of the unit selected wheats tried on a large scale, Baxi Pt. 7 and Pusa 4 Pt. 7 that were grown on 2½ and 1¼ gunthas yielded 1,248 and 1,632 lbs. per acre respectively.

The above seed will be multiplied on a large scale on the farm next year for comparison, and if they maintain the same standard as regards yield and quality, the resulting seed will be distributed in the district.

19. *Cultural Experiments.*—The whole of the farm area was sown with a drill 2′ as against the ordinary practice of sowing after a plough 15″ to 18″ apart and the marked success of sowing wider apart was demonstrated to the Bhil and other cultivators of Dohad and Jhalod Talukas by holding two Party demonstrations on the farm.

Though the season was bad for Dohad Taluka, the farm was able to secure 1,405 lbs. of Maize per acre (average of about 24 acres) simply due to wider sowing and repeated interculturings.

20. *Varietal Experiments.*—Kolamba rice No. 42 from the Karjat Rice Breeding Station was tried along with Jirasal and Sutarsal. The results were very satisfactory in a bad year like this, yielding 2,936 lbs. for Jirasal, 2,450 lbs. for Kolamba No. 42 and 1,808 for Sutarsal. They will be tried again this year for further comparison.

21. (*d*) *Amalsad Farm.*—There was no appearance of Red-rot in the sugarcane either on the farm or in the surrounding villages. Of the six varieties grown last year one Pundya variety was dropped in the year under report and two new varieties from Pusa Co. 210 and Co. 213 reputed to be very heavy yielders and hardy were added. Of all these 7 varieties the same three, *viz.*, Red Sport, Manjav and Stripped Mauritius, have kept up their reputation and are in big demand in the tract. All the available seed of these varieties was sold to the surrounding cultivators. Among these three promising varieties too, the choice of the cultivators has fallen on the Red Sport as it can withstand drought and longer *intervals* between irrigations while the other two have a tendency to lodge due to their vigorous growth.

22. The new varieties Co. 210 and Co. 213 are very thin hard canes and have very good tillering power, 7 to 15 tillers per plant as against one to four of the others. Although they are vigorous in growth and good-tillering, it is not likely they would be taken up by the cultivators due to very heavy charges of stripping and crushing on account of their being

too thin and hard. But they are very good for growing round the margins of the fields growing soft cane and also in places where the soil is somewhat saltish as on the sea-coast. One trial more will be necessary before any definite conclusion can be arrived at.

23. *New Crops.*—Of the new crops tried last year Parwar has done the best. The value of produce per acre was Rs. 1310-10-0 while the cost of cultivation was Rs. 835-12-6. In addition to the above Rs. 141 worth of cuttings were sold to the cultivators in the tract for planting. If the cultivation is properly attended to, the introduction of Parwar cultivation in the tract will be a boon to the surrounding cultivators.

As regards the 20 Plantain varieties tried last year, most of them have borne fruits, but definite conclusions will be arrived at next year.

24. All the available help was given to the surrounding cultivators by giving them on loan, free of cost, the iron ploughs, ridgers, etc., also helping them in securing Ammonium Sulphate for manuring. The practice of set planting is also increasing in the vicinity.

(3) *Insect and other Crop-pests*

25. *Jowar Stem-borer Investigation.*—This was continued by the Special Entomological Officer at Surat, being financed from the Sir Sassoon David Trust Fund. Publication of a memoir under contemplation will now include also the results obtained during the year under report. One of the features observed during the year is that a trap plot of Jowar itself sown with the first showers of rain helped to a very great extent the late sown actual crop of jowar in preventing the first brood of the pests damaging the main crop, as nearly 100 caterpillars per 100 plants were found in the trap plot about forty days after it was sown.

26. *Katra (Hairy caterpillar—Amsacta mooreii) Investigations* were continued this season too on the Dohad Farm by the Entomological Assistant on various flours from cereals and pulses such as rice, bajri, wheat, jowar, tamarind-seed, gram, banti, maize and kodra, for mixture with Paris Green for dusting in trenches and beds in the fields. Dry Mowhra-flower (Bassia latifolia) baits were also tried in the latter stage of the larvæ, in bed method. It was finally found that the number of dead Katras was about four times more by using these baits than by any other flour-mixture. Amongst flour-mixtures, bajri, jowar and gram have given better results, and the gram flour is the best, wherever it is cheap, as it is very adhesive and not easily washed away. After this season's reports from the different workers it will be finally decided either to extend the operations on a very large scale, say in a radius of five miles or so if found successful, or they will be discontinued.

27. *Stored grain pests Investigation* has been taken up this year, the results of which will be reported next year. The effect of carbon bisulphide used in fumigating 6300 lbs. of jowar on Surat Farm was, however, found to be very good.

28. *Other pests.*—Investigations on Tanymicus weevils on jowar seedlings and woolly mites on cotton on the Surat Farm and surface grass-hoppers in the Broach District have also been undertaken.

(4) *Experimental Trials in the Districts*

29. *Cotton.*—In Surat District efforts were made to introduce 1027 A. L. F. cotton as a new crop at three places in Bulsar Taluka and one place in Pardi Taluka. The yield was not very high, but it is expected to increase as the people would come to know about its cultivation in places where nothing else but grass is grown. The area under cotton in Pardi Taluka went upto nearly 200 acres.

In Broach District, wilt-resistant type of cotton seed was tried successfully and this has been much in demand. In Ahmedabad District at Ashlali and Kanbha of South Daskroi Taluka 1027 cotton was tried in about 40 acres, helped by one or two irrigations where possible and has found favour with the cultivators, as the produce was valued at Rs. 10 more than the local Lalio, though the ginning percentage was a bit lower due to the mixture of Ghoghari in the local.

Cylindrical Boll type of cotton was tried at Talod on about 12 acres, which yielded 334 lbs. per acre in a lean year. The seed of this type is likely to succeed in Modasa tract.

Wagad cotton strains were tried at Ranpur and liked by the cultivators at Galsana as a more reliable crop than the local Mathio cotton.

30. *Rice.*—The new strains Kolamba Nos. 35 and 42 were tried at Ashlali in comparison with local Jirasal. No. 42 yielded 1500 lbs. per acre while the Jirasal dried up, though both were irrigated simultaneously. No. 42 variety being more drought resistant and having a fine grain is likely to be a good substitute in rice growing tract under canal in years of scarcity. In Surat District, Kolamba rice was tried at three places but could not make headway for want of rains.

31. *Wheat.*—Pivalkantha type from the Crop Botanist, Poona, tried in Bokh at Prantij yielded 1600 lbs. per acre. It resembles the Daudkhani type grown in Bhal, and fetches Re. 1 more per local maund than the local Wajia type. Pusa 4 wheat specially introduced at Prantij gave an excellent crop in comparison with local Wajia.

32. *Tobacco.*—Strain No. 6 was distributed over 200 acres at Boriavi, Lambhwel and Wagashi in Kaira District. The plantations, both dry and irrigated, yielded 15 to 20 per cent. more than the local, resulting in huge demand for the seed. This strain was also successfully tried in Ahmedabad and Panch Mahals Districts.

33. *Groundnut.*—Magadi variety was grown at Tarwada (Taluka Kalol, District Panch Mahals) and found yielding higher than the Japan variety usually grown. Efforts are being made to grow pure variety of Spanish peanut in Dohad and Jhalod, eliminating the mixture of small Japan, objected to by the trade.

34. *Manuring.*—The Cotton Fertilizer from Union Agency was tried in various cotton tracts, but its results were not encouraging mostly due to the failure of rains.

Sodium Nitrate, though found useful for Tobacco and other garden crops, did not give appreciable net profits for the increased returns.

Ammonium Suphate was applied to Suran crop at Pipalghabhan (Taluka Chikhli, District Surat), which gave a clear profit of Rs. 135-8-0 per acre, deducting the value of the manure.

(5) *Miscellaneous trials, adoption of new methods, etc.*

35. *Ridge Cultivation.*—This was successfully tried in nine places on about 97 acres in Olpad Taluka (District Surat) and on 10 acres in Broach District.

The method of broad sowing at a distance of 12′ and square dibbling were successfully tried on 34 acres in the Broach District.

36. *Protection of crops from wild animals.*—An organised effort was made for poisoning pigs and jackals devastating the valuable crops grown in Chikhli Taluka. A Graduate Assistant with three temporary Kamgars was specially engaged for seven months. Due to shortage of rains the area under crops was reduced and there was less scope for the pigs to damage the crop. The pigs ate away the baits freely in the beginning; but the animal being shrewd, the form of baits had to be changed from time to time. In all 50 lbs. of poison (white arsenic and strychnine Hydrochloride) costing about Rs. 34 was used in preparing baits, of which 600 were found eaten away by the wild animals and 581 baits left uneaten had to be destroyed. The actual number of animals located as dead from the effect of the poison was 130, of which 65 were pigs, 60 jackals and 5 others. Besides this, there must be a large number of dead animals not found out, as these animals after eating the baits generally go away long distances which makes it impossible to trace them. The dose increased upto 2 tolas was, however, found very efficacious. The cost of destruction per animal by this method came to Rs. 1-2-0 including pay of the temporary Kamgars and Re. 0-0-10$\frac{3}{4}$ only without it. Thus it is a cheaper method of destruction of wild animals, but to achieve good results the knowledge of their haunts and breeding places as well as an organised effort on the part of the villagers is essential.

A pig proof fencing at an actual cost of Rs. 830 has been put at Pipalghabhan (Taluka Chikhli) and given to one cultivator as an experimental trial for one year.

The total number of poison packets distributed by the Entomological Assistant during the year was 1148 of which results were received for 236 packets only reporting the death of 17 pigs and 85 jackals and 5 wild cats.

III. Organisation and Propaganda

37. (*a*) *Organisation.*—To secure and extend the introduction of the improvements discovered by this Department as described in the last chapter, there is one Divisional Superintendent of Agriculture for North Gujarat and five District Agricultural Overseers, one in each of the five Districts, helped by one kamgar each. For District cotton work in South Gujarat there is one Cotton Superintendent (Provincial Officer) assisted by three Graduate Assistants. The District Agricultural Overseers of Broach, Kaira, Panch Mahals and Ahmedabad are also looked upon as co-operative organisers as each of them has to attempt to organise the rural community on co-operative lines for the purchase of agricultural

requisites or for the sale of agricultural products. There is a special Agricultural Organiser of Co-operative Societies, for the tract South of the Narmada, which comprises of the whole Surat District and Hansot and Ankleshwar Talukas of the Broach District, and the District Agricultural Overseer, Surat, has to look after the agricultural propaganda work only. The work of all these propaganda officers is controlled and supervised by the Gujarat Divisional Board of Agriculture. There were four quarterly meetings of the Board held during the year and one special meeting of the Divisional Cotton Committee attached to the Board. The members of both the bodies worked with enthusiasm and considerable success.

38. *Co-ordination of the Activities of the Agricultural and Revenue Departments* for the introduction of certain improvements was fully achieved in two Districts, Surat and Panch Mahals. In other three Districts preliminary meetings could not be held last year before the advent of rains which were earlier than usual. This year (in May and June 1926), however, meetings could be held in all the five Districts and the Revenue officials and Local Boards who were infused with the spirit of agricultural improvements were brought in better touch with the Agricultural Department to co-operate in the agricultural propaganda work. The most beneficial effect of this co-ordination has been noticed in expedition of organised efforts for formation of Taluka Development Associations, which was impossible without the cordial help of the Revenue officials.

39. *Taluka Development Associations.*—The Chorasi Taluka Development Association, started in 1922, has been working well. The Jalalpore Taluka Development Association started its work since February 1926, with the help of Mr. B. J. Patel, Mamlatdar of Jalalpore. Though the agricultural season was a bad one last year, two more Development Associations could be started, one in South Daskroi Taluka with the help of Mr. Hiralal Lakhia, Mamlatdar of South Daskroi, and the other in Anand with the help of Mr. Labhshankar Dwiwedi, Mamlatdar of Anand. Arrangements have also been completed to make the opening ceremony of the third one in Borsad Taluka on 4th October 1926. Besides, provisional committees for starting Taluka Development Associations have been formed in Bulsar and Olpad Talukas, and movements are already set on foot to organise similar Associations in Thasra, North Daskroi, Viramgam, Halol and Kalol Talukas, and it is possible that the remaining Talukas will have their own Development Associations in a few years more.

40. *Agricultural Associations.*—As a result of the co-ordination of the Agricultural and Revenue Departments, the District Agricultural Officers could also revive the dormant old Agricultural Associations in Chikhli, Mehmedabad, Thasra, Kapadvanj, Borsad and Nadiad Talukas and started a new one in Matar Taluka.

41. *Non-credit Agricultural co-operative work.*—The Agricultural Organiser, Co-operative Societies, organised one more society, making in all 17 Non-credit Agricultural Co-operative Societies in his jurisdiction. The District Agricultural Overseer, Broach, started one more Co-operative Cotton Sale Society at Dabhali.

Efforts were made to revive the Jamiatpura and Unvarsad Cattle Insurance Societies (Ahmedabad District) and Limbasi and Traj Seed Societies and to start Pumping Society at Anklav, Saijpur (Kaira District) and Derol (Panch Mahals); but no new society could be started owing to various unavoidable reasons.

(*b*) *Departmental Propaganda Work*

(1) *Cotton Transport Act*

42. The Government has now fixed the policy of having only one improved type of cotton recommended by the Agricultural Department grown throughout the whole Surat cotton tract. It is gratifying to mention that the Co-operative Societies in Olpad and Mandvi talukas which were against the growing of 1027 A. L. F. cotton recommended by the department have now realised its importance and agreed to take to it, after satisfying themselves by actually growing the improved type, in comparison with their own Selection 1A. It is thus likely that the restriction of the Cotton Transport Act between the North and South Surat Area will be soon relaxed.

(2) *District Cotton Work*

43. *Surat Tract.*—The total area under the control of the department was 11,617 acres 24 gunthas against 11,551 acres 4 gunthas of the last year, the whole area being under 1027 A. L. F. The total quantity of Kapas handled by the Department from the controlled area was 3,108 Bhars 21 maunds and 25 seers, yielding 1,216 Khandis (1 Khandi = 798 lbs.) of lint or about 2,432 full pressed bales. The premium realised was on an average Rs. 15 per Khandi only, as there was no competition from the Bombay Millowners or the exporting firms. Practically the whole lot was purchased by the Ahmedabad Millowners. In addition to the above 108 Khandis of lint belonging to the Sadakpore Group Cotton Sale Society which had grown 1027 A. L. F. was sold through the department.

44. *Seed Distribution.*—The total quantity of seed purchased from the Director of Agriculture's Personal Ledger Account was 1,588 Gallis equal to 1,905,600 lbs. which was distributed as under :—

(*a*) Tract South of Narmada including the Baroda State territories—

	Lbs.
(1) Nandod State	784,200
(2) Vyara	26,400
(3) Maroli	21,600
(4) Kim	52,800
(5) Mangrol	40,200
(6) Sonsak Co-operative Sale Society ..	30,000
(7) Sayan and Olpad	54,000
(8) Hansot Co-operative Sale Society ..	39,600
(9) Sarbhon Co-operative Sale Society ..	3,600
	1,052,400

(*b*) Tract North of the Narmada—

	Lbs.
(1) Administrator, Chhota Udepur State ..	528,300
(2) District Agricultural Overseer, Ahmedabad.	4,200
(3) District Agricultural Overseer, Panch-mahals	760
(4) Mahalkari, Halol	960
Total ..	1,586,620

The main feature of the distribution is that like the Rajpipla State, the Administrator, Chhota Udepur State, decided to have the whole of his State grown with this seed and indented, though little late in the season for 528,300 lbs. of seed 1027 A. L. F. for the purpose. However the quantity was supplied.

In addition to the above the Chairman, Hubli Co-operative Cotton Sale Society, was supplied with 11,250 lbs. of seed. The demand for seed was so great that even 500,000 lbs. more seed could have been distributed. If the same demand continues it will be necessary for the department to control at least 15,000 acres instead of nearly 12,000 acres now controlled.

(2) *Broach Tract*

45. Fifteen thousand pounds of 1,027 cotton seed was distributed to meet the increased demand for improved type of cotton from the cultivators of Jambusar and Broach talukas. They were satisfied with the better staple of the produce, but owing to its low ginning percentage they could not realise the prices that they did for the local which has always a higher ginning percentage due to Ghoghari mixture occurring in the local from 54 to 85 per cent. The seed of a new type (1A Broach 9_1) evolved on the Broach Farm whose ginning percentage has been proved to be superior to that of the local is therefore being multiplied this year and the seed produced will be available for distribution in selected places next year.

(3) *North Gujarat Cotton Tract*

46. Eight hundred and fifteen pounds of seed of 1924-25 season of the four strains bred on the Viramgam Cotton Breeding Station were given for multiplication to an enthusiastic cultivator of Bhojva near Viramgam and 2,500 lbs. of seed produced from the same was distributed in 1925-26 to selected cultivators at Dholka, Ranpur and Sokhli. In spite of the bad season for cotton, the growers have fully appreciated the resulting better quality and the higher ginning percentage. It is now intended to encourage only the better two of these four strains, *viz.*, Pt. 4 and 8 and hence all the farm-bred seed of these as well as the seed obtained from the registered seed growers amounting to 2,347 lbs. has been given for multiplication at Bavla (taluka Dhandhuka) and Bhojva and Sokhli (taluka Viramgam) to cover an area of about 150 acres this season.

47. (3) *Demonstrations and Shows.*—The year under report being a lean one, the general demonstrations had to be dropped. Only special demonstrations that could be held were sixteen in Surat District including one party demonstration on Surat Farm, two in Broach, three in Kaira and four in Panchmahals districts (including two-party demonstrations on Dohad Farm). They were all very impressive and served the purpose for which they were held, to a great extent. Besides these, numerous petty demonstrations to show the use of improved implements, copper sulphate in steeping of jowar seed, etc., were continued and extended. In all 9,281 packets of Copper Sulphate were sold by the department during the year. Besides people at some places who are already convinced of its advantages, generally purchase it from the bazaar. In Broach District, the area under staple jowar is increasing due to this sure remedy, as can be seen from the figures for the past three years, *viz.*, 10,904, 11,168 and 12,400 acres.

In Bulsar, Pardi and Chikhli talukas, the working of 25 implements was demonstrated in 22 villages on an area of acres 83-10 for about 184 days. In Broach District efforts were made to popularise by actual demonstration the use of ridging and Malva ploughs, as a result of which eleven Malva ploughs and one ridging plough were purchased by cultivators. In Ahmedabad and Panchmahals districts, the Surat and Broach hoes, harrows and drill are so much liked by the people that after this pattern from the models kept in depôts, several hoes, harrows and drills were prepared locally in Modasa, Prantij, Dohad and Jhalod talukas.

The use of Middle Breakers for ridging of cotton, chillies, brinjals, tobacco, rice, etc., and of MacCormic Cultivator for interculturing was shown at Ashlali, Bavla, Keralu and Prantij in Ahmedabad District and at four places in Kaira District; the total area worked being 67 acres.

Insect demonstrations and magic lantern shows were held at seven places in Surat District.

IV. Service

48. *Implement and seed depots.*—The six depôts like last year were continued. The total hire charges earned by them were Rs. 54-1-0 as compared with Rs. 51-12-0 of the previous year.

49. *Distribution of seeds, manures and implements*—(1) *Seeds.*—In all 77,986 lbs. of seed (excluding those distributed by the district cotton staff in lower Gujarat) were distributed, important of which were 6,000 lbs. of san seed in Broach District; 55,880 lbs. of Selection 1-A cotton seed in Kaira District; 4,005 lbs. of 1027 A.L. F. cotton seed in Ahmedabad District; 400 lbs. of N. R. cotton seed and 80 lbs. of 1027 A. L. F. cotton seed in Panchmahals District; 1,160 lbs. of pure Spanish peanut and 1,440 lbs. of Magadi groundnut in Panchmahals District.

(2) *Implements.*—In Surat District implements worth Rs. 1,365 including two mowing machines were distributed. In Broach District seventeen implements including eleven Malva ploughs were supplied. In the three districts of North Gujarat 81 implements including shares and spare parts were sold.

(3) *Manures.*—In all 273 cwts. and 104 lbs. were distributed, of which the important ones were ammonium sulphate, bone-meal, denatured salt and sodium nitrate.

(4) *Budding.*—Eight hundred seventy *bor* trees were budded with the help of an expert mali sent by the Horticulturist. In addition, 265 mango grafts were also made by him.

50. *Boring.*—Six machines continued to work. There were about 68 applications registered for boring. During the year 57 new bores were undertaken and five bores left incomplete last year were completed. Out of 62 bores thus made involving a total depth of 3,870 feet and 6 inches, 35 bores (or 62·5 per cent.) were successful, giving 39,250 gallons of water per hour; 21 failed and 6 were left incomplete (*vide* detailed statement attached). The failure was due in nine cases to unfavourable strata (such as fissure, hard rock, pebbles, etc., wherein tools would not be worked); in four cases due to insufficient water tapped; in four cases due to refusal of well-owners after trying the bores for certain depths; in two cases due to tapping of brackish water; in one case due to failure in removing the accident from the bore hole and in one case due to breakage of casing pipe in the bore. The total expenditure including permanent boring establishment during the year amounted to Rs. 17,118-12-9 and the total recoveries of boring charges to Rs. 5,106-10-8 those in arears being Rs. 6,186-2-4.

51. *Mechanical help.*—The Mechanical Assistant got 42 enquiries including 4 pending of the last year; out of which 36 were attended and 6 in arrears. These included 22, 10, 4, 3 and 3 from Surat, Broach, Kaira, Panchmahals and Ahmedabad districts respectively. The works executed by him were as under:—

Works belonging to					Nature of work done
Government	Local Board	Individual cultivators	Co-operatives Societies	Total	
..	..	3	1	4	Erection of pumping plants.
..	..	2	..	2	Advised in erecting pumping plants.
3	..	2	2	7	Repairs to pumping plants.
..	..	5	4	9	Site survey.
1	..	8	2	11	Estimates and drawings.
..	1	1	..	2	Overhauling of hand pumps.
1	..	55	1	57	Inspecting and giving instructions to owners of pumping plants.
10	..	..	..	10	Giving lectures to the students of the V. A. School, Surat.
4	1	2	..	7	Miscellaneous.
19	2	78	10	109	Total.

In addition he conducted ploughing the land about 33 acres by the 22-40 Case Tractor on the Surat Farm. Out of 323 working days during the year he spent 181 days in executing works of Government and 142

days for others. There was almost no occasion to call upon him for the same work a second time and hence no fees were charged for his help to the cultivators during the year.

52. *Destruction of crop pests.*—(1) *Katra or Hairy caterpillar* (*Amsacta mooreii*).—Dusting operations for the control of katras were continued with Paris green poison mixed with 30 times or in later stage 25 times of flour of gram, bavta and bajri on 150 acres of maize crop on Dohad Farm and Galalia Falia, on 15 acres of bavto nurseries at Rakhial and 25 acres of cotton and bajri at Prantij respectively, and the mixtures were found effective. A proportion of 1 : 10 of Paris Green poison and flour mixed with 40 lbs. of mowra flower was also found more effective in later stage of the pest. The crops thus treated were almost saved from the ravages of katras while the surrounding fields that remained untreated were completely devoured by them.

(2) *Leaf bug on Brinjals* had done immense damage at Sanand and Prantij. Spraying the crops with fish oil rosin soap water successfully saved a plot of 1½ acre at Sanand and 1 acre at Prantij to the value of Rs. 1,000 and Rs. 230 respectively.

(3) *Mites on chillies* (known as dundvo and kokdvo) was found intensive at Sanad, Ashlali and Kanbha (Taluka South Daskroi) and Nana Varachha (Taluka Chorashi). The disease was successfully controlled by dusting the crop on two acres with sulphur and lime mixture.

(4) *Jassids on Bhindi* crop (vegetable) had seriously attacked a two guntha plot of the students of the Vernacular Agricultural School, Surat. Spraying with a strong dose of fish oil rosin soap was found more effective than crude oil emulsion and the plants were all saved.

(5) *Mango stemborers* at Amalsad, Haria (Taluka Pardi), Karamsad (Taluka Anand), and Utran (Taluka Chorashi) were successfully controlled and trees saved by different treatments.

V. Agricultural Education

53. *The Vernacular Agricultural Schools at Godhra* (started in 1920) *and Surat* (started in 1923) opened their classes with 30 and 32 students. The number of applicants seeking admission to the Godhra and Surat Schools were 42 and 35 respectively of which 19 and 14 were admitted in the first year. The results of their annual examination held in April 1926 were :—

	No. of boys in Godhra		Surat	
	Appeared	Passed	Appeared	Passed
1st year	14	11	17	13
2nd year	16	14	12	8

The total expenditure of the Godhra and Surat Schools during the year was Rs. 10,363-3-6 and Rs. 10,023-13-9 respectively; of which Rs. 500 each were provided from the Sir Sassoon David Trust Fund, for maintenance charges of the boys in part. Besides Rs. 200 were contributed by the Panch Mahals District Local Board to the Godhra School. The total receipts of the Godhra and Surat Schools amounted to Rs. 967-10-3 and Rs. 1,296-6-1 respectively. The average feeding expense per boy per month to Government was Rs. 10-1-0 and Rs. 8-0-0 respectively and that of the whole institution Rs. 17-5-0 and Rs. 21-5-0 respectively.

54. *Agricultural Education to the Students of Primary Schools.*—This was continued at the Dharala Boarding School adjoining the Vernacular Agricultural School, Godhra, by the staff of the latter. An Agricultural Bias class being started at the Dohad Bhil Central School, the agricultural training by the Dohad Farm staff there was discontinued. All the fourteen boys of the Dharala Boarding School at Godhra got successfully through the annual examination.

55. *Training of* five more *Primary School Teachers* was successfully completed at the Godhra Vernacular Agricultural School, for the introduction of the agricultural bias course in rural schools.

VI. Publications

56. The publication of the Broach Quarterly magazine was continued besides publishing articles on agricultural matters in local papers. In all 30 articles were published by the Agricultural staff in this Division. The Departmental publications for which material was supplied by the officers from this Division during the year were :—

Memoirs.—(1) Studies in Gujarat Cottons Part III by Mr. M. L. Patel, Cotton Breeder, South Gujarat and Mr. D. P. Mankad, Cotton Breeder, North Gujarat.

Bulletins.—(1) No. 123 of 1925 Ridge cultivation by Rao Saheb Bhimbhai M. Desai, Deputy Director of Agriculture, Gujarat and Mr. K. B. Naik, Superintendent, Surat Farm;

(2) No. 129 of 1926 Study on growth of Tobacco planting on poor soils of Gujarat by Dr. Harold H. Mann, Director of Agriculture, Bombay Presidency, and Messrs. M. L. Patel, Cotton Breeder, South Gujarat and V. M. Majmudar, Tobacco Breeder, Nadiad.

Leaflets.—Leaflet No. 5 of 1926. Improved Tobacco seeds. No. 4 Katra or Hairy caterpillar of Gujarat.

VII. Conclusion

57. The work done by the propaganda staff and the research staff was on the whole very satisfactory. The work of Mr. V. D. Desai under the Cotton Superintendent, Surat, in charge of Bardoli group deserves special mention. My office staff and specially my Head clerk Mr. Bhatye

continued to show the same zeal in their work. Mr. Bhatye deserves every credit in so ably managing my office with a very limited number of clerks when the office work has nearly doubled.

Surat, dated the 22nd August 1926.

BHIMBHAI M.,
Deputy Director of Agriculture, Gujarat, Surat.

Statement showing details of Boring referred to paragraph 50 of the Annual Report for 1925-26

APPENDIX

Serial No.	Name of the well or Land owner	Taluka	Village	Date of commencement
	Bores left incomplete last year and completed in 1925-26			
	Ahmedabad District			
9	Mr. Hosangji Burjorji	S. Daskroi ..	Vatva ..	20 April 1925.
11	Umedram Kalidas	Do. ..	Kubadthal ..	21 May 1925.
	Surat District			
10	Mr. Kunverji Lalubhai	Pardi ..	Tukwada ..	21 May 1925.
11	,, Lalbhai Kalyanji	Chikhli ..	Kharoli ..	30 April 1925.
	Panch Mahals District			
2	Bhagwanlal Ganesh	Baria ..	Piplod ..	21 May 1925.
	Bores done in 1925-26			
	Ahmedabad District			
1	Mr. Bhulabhai Harji	S. Daskroi ..	Vaneh ..	17 June 1925.
2	,, Dinshaw Bamanji Dalal ..	Modasa ..	Dhansura ..	27 July 1925.
3	,, Devalbhai Jibhai	S. Daskroi ..	Vanch ..	19 August 1925.
4	,, Dinshaw Bamanji Dalal ..	Modasa ..	Dhansura ..	17 September 1925.
5	,, Premchand Kalidas	Do. ..	Do. ..	6 October 1925.
6	,, Hariprasad Keshavlal ..	S. Daskroi ..	Nadej ..	11 October 1925.
7	Do.	Do. ..	Do. ..	26 October 1925.
8	Mr. Ganibhai Adambhai	Modasa	Kolikhad ..	1 November 1925.
9	Do.	Do. ..	Do. ..	13 November 1925.
10	Mr. Vaghjibhai Bhathibhai ..	Do. ..	Do. ..	21 November 1925.
11	,, Ambalal Narandas Mali ..	S. Daskroi ..	Madalpur ..	28 November 1925.
12	,, Ranchhodbhai Bakorbhai ..	Do. ..	Aslali ..	24 December 1925.
13	,, Jethabhai Shankarbhai ..	Do. ..	Do. ..	2 March 1926.
14	,, Naranbhai Ranchhod ..	Prantij ..	Kherol ..	5 March 1926.
15	,, Jethabhai Shankarbhai ..	S. Daskroi ..	Aslali ..	16 March 1926.
16	,, Kalidas Vallabhdas	Sanand ..	Manipur ..	10 May 1926.
17	,, Lakhabhai Shankarbhai ..	S. Daskroi ..	Vasai ..	27 May 1926.
18	,, Narotam Bajibhai	Sanand ..	Manipur ..	3 June 1926.
	Surat District			
1	Mali Lalbhai Amtharam	Chorasi ..	Foolpada ..	16 June 1925.
2	Mr. Jalbhoy Pestanji Dhanbhura ..	Bulsar ..	Tithal ..	1 July 1925.

Date of completion	Actual No. of working days	Total depth of boring	Diameter of bore	Water before boring in gallons per hour	Water level before boring	Water after boring in gallons per hour
24 June 1925.	17	120′	4″	3,000	16′	6,000
11 June 1925.	14	115′	3″	250	28′	1,250
4 June 1925.	5	6′	6″	....	....	....
15 June 1925.	18	15′ 6″	4½″	....	....	....
6 June 1925.	4	2′	4″	500	10′	500
18 August 1925.	22	74′	3″	250	13′	250
14 September 1925.	33	80′	4″	....	....	....
6 October 1925.	21	96′	3″	250	7′	750
3 October 1925.	12	65′ from surface.	6″	....	Tube Well.	Sufficient in pump.
27 October 1925.	15	60′	6″	....	....	15′ water in bore.
23 October 1925.	6	50′	3″	225	9′	3,225
23 November 1925.	25	112′	3″	3,225	9′ 8″	3,225
12 November 1925.	6	10′	4″	200	5′	200
19 November 1925.	4	9′	4″	200	5′	200
10 December 1925.	8	32′	4″	200	5′	200
15 February 1926.	80	229′	3″	2,000	15′	5,000
23 February 1926.	47	245′	4″	225	15′	775
15 March 1926.	8	73′	4″	1,000	24′	1,500
30 April 1926.	45	225′	3″	500	6′	500
16 May 1926.	20	132′	4″	1,500	24′	2,000
31 May 1926.	16	100′	3″	225	18′	1,225
....	20	138′	4″	....	....	....
....	25	125′	3″	....	....	....
5 August 1925.	22	62′	4″	1,000	26′	3,000
30 July 1925.	9	37′	4″	2,000	28′	3,000

APPENDIX

Serial No.	Name of the well or Land owner	Water level after boring	Increase of water supply	Flat charges
	Bores left incomplete last year and completed in 1925-26			Rs. a.
	Ahmedabad District			
9	Mr. Hosangji Burjorji	16′	3,000	373 0
11	Umedram Kalidas	28′	1,000	327 8
	Surat District			
10	Mr. Kunverji Lalubhai	....	....	....
11	,, Lalbhai Kalyanji	....	....	....
	Panch Mahals District			
2	Bhagwanlal Ganesh	10′	....	....
	Bores done in 1925-26			
	Ahmedabad District			
1	Mr. Bhulabhai Harji	13′	....	....
2	,, Dinshaw Bamanji Dalal ..	....	....	....
3	,, Devalbhai Jibhai	7′	500	119 0
4	,, Dinshaw Bamanji Dalal ..	28′ water in bore.	1,000	72 8
5	,, Premchand Kalidas	15′ in bore.	1,000	65 0
6	,, Hariprasad Keshavlal ..	9′ 8″	3,000	50 0
7	Do.	9′ 8″	....	....
8	Mr. Ganibhai Adambhai	5′	....	....
9	Do.	5′	....	....
10	Mr. Vaghjibhai Bhathibhai ..	5′	....	....
11	,, Ambalal Narandas Mali ..	15′ 6″	3,000	318 8
12	,, Ranchhodbhai Bakorbhai ..	15′	500	342 8
13	,, Jethabhai Shankarbhai ..	24′	500	84 8
14	,, Naranbhai Ranchhod ..	6′	....	....
15	,, Jethabhai Shankarbhai ..	24′	500	173 0
16	,, Kalidas Vaibhdas	18′	1,000	125 0
17	,, Lakhabhai Shankarbhai ..	....	....	....
18	,, Narotam Bajibhai	....	....	....
	Surat District			
1	Mali Lalbhai Amtharam ..	28′	2,000	68 0
2	Mr. Jalbhoy Pestanji Dhanbhura ..	28′	1,000 salt-ish water.	....

F—*contd.*

Cost of pipes and shoes	Labour charges	Cost of fuel, Lubricating oil, coal, etc.	Total cost	Cost per foot	Result
Rs. a. p.	Rs. a.	Rs. a.	Rs. a. p.	Rs. a. p.	
177 0 0	227 8	30 8	808 0 0	6 11 9	Successful.
132 0 0	60 0	19 4	538 12 0	4 11 0	Do.
....	22 8	10 0	32 8 0	5 6 8	Failure.
....	50 0	20 0	70 0 0	4 8 3	Do.
....	20 0	10 0	30 0 0	15 0 0	Do.
....	55 0	15 0	70 0 0	0 15 2	Failure.
....	100 0	30 0	130 0 0	1 10 0	Do.
113 0 0	112 0	18 8	362 8 0	3 12 5	Successful.
....	71 10	26 8	170 10 0	2 10 0	Do.
....	51 5	23 11	140 0 0	2 5 4	Do.
59 0 0	67 0	11 4	187 4 0	3 11 11	Do.
67 0 0	112 0	35 0	214 0 0	1 14 7	Failure pipe jam.
....	27 0	10 0	37 0 0	3 11 2	Failure tool cannot work.
....	18 0	6 0	24 0 0	2 10 8	Failure.
....	36 0	15 0	51 0 0	1 9 6	Failure water tapped in very little quantity.
235 0 0	283 0	65 0	901 8 0	3 15 0	Successful.
379 8 0	211 8	60 0	993 8 0	4 0 10	Successful water tapped but it is below level.
136 8 0	40 0	17 0	278 0 0	3 13 0	Successful.
217 0 0	200 0	50 0	467 0 0	2 1 3	Failure as the well owner refused to go further.
225 0 0	200 0	50 0	648 0 0	4 14 6	Successful.
124 0 0	100 0	26 8	375 8 0	3 12 11	Do.
....	....	....	....	....	Incomplete.
....	....	....	....	....	Do.
104 8 0	75 0	31 4	278 12 0	4 7 11	Successful.
50 0 0	40 0	15 0	105 0 0	2 13 6	Failure salt water tapped.

APPENDIX

Serial No.	Name of the well or Land owner	Taluka	Village	Date of commencement
	Bores done in 1925-26—contd.			
	Surat District—contd.			
3	Cotton Spinning and Weaving Mills ..	Surat ..	Begaumwadi ..	14 August 1925.
4	Mr. Ghelabhai Paragji	Jalalpore ..	Eru ..	15 August 1925.
5	Cotton Spinning and Weaving Mills ..	Surat ..	Begaumwadi ..	14 September 1925.
6	Do. do. ..	Do. ..	Do. ..	15 October 1925.
7	Mr. Lalbhai Bavabhai	Pardi ..	Vapi ..	8 November 1925.
8	Do.	Do. ..	Namdha ..	21 December 1925.
9	Mr. Naranji Gandabhai	Do. ..	Do. ..	14 February 1926.
10	,, Durlabhbhai Ranchhodji ..	Pardi ..	Pardi ..	10 March 1926.
11	Do. ..	Do. ..	Do. ..	20 March 1926.
12	Mr. Maganlal Chunilal	Do. ..	Do. ..	3 April 1926.
13	Sonsak Ginning Society	Chorasi ..	Jehangir Para ..	6 April 1926.
14	Shah Vajechand Chhaganlal ..	Pardi ..	Nana Vaghchhipa.	28 April 1926.
15	Desai Kalyanji Gopalji	Jalalpore ..	Kharsad ..	13 May 1926.
16	Mr. Uttamchand Kilachand ..	Pardi ..	Rampore ..	23 May 1926.
17	Mr. Dolatrai Naranji	Jalalpore ..	Kharsad ..	29 May 1926.
18	Sheth Nanubhai Bhaidas	Pardi ..	Sukhlar ..	7 June 1926.
19	Desai Gopalji Ranchhodji	Jalalpore ..	Kharsad ..	12 June 1926.
20	Sheth Pirojshaw Vicaji Bhiladwala.	Pardi ..	Pardi ..	13 June 1926.
21	Sardar Faramroz B. Garda ..	Jalapore ..	Abrama ..	24 June 1926.
22	Seth Pirojshah Vicaji Bhiladwala ..	Pardi ..	Pardi ..	27 June 1926.
1	Sheth Bhagubhai	Kamraj (Under Baroda State.)	Akhakhol ..	23 January 1926.
2	Do.	Do. ..	Antroli ..	5 March 1926.
	Panch Mahals District			
1	Mr. Bhagwanlal Ganesh	....	Piplod ..	28 September 1925.
2	Punamchand Jethalal	Halol ..	Vankuva ..	8 November 1925.
3	Jhaveri Kalidas Dayal	Do. ..	Manipur ..	23 December 1925.
	Do.	Do. ..	Do. ..	4 January 1926.
	Do.	Do. ..	Do. ..	22 January 1926.

F—*contd.*

Date of completion	Actual No. of working days	Total depth of boring	Diameter of bore	Water before boring in gallons per hour	Water level before boring	Water after boring in gallons per hour
10 September 1925.	20	62′	4″	....	Kacha well.	1,000
12 October 1925.	13	108′	4″	2,000	15′	3,000
14 October 1925.	23	52′	4″	....	Katchha well	100
11 December 1925.		88′	....	....	....	....
18 December 1925.	12	45′	6″	1,000	21′	1,000
10 February 1926.	10	95′	6″	500	17′	500
24 February 1926.	5	18′	6″	200	10′	200
19 March 1926.	5	18′	6″	1,500	16′	2,500
30 March 1926.	7	33′	6″	2,500	17′	3,500
26 April 1926.	18	125′	6″	500	6′	500
15 June 1926.	35	113′	4″	Failure as	Saitish water	tapped
19 May 1926.	18	68′	6″	250	10′	250
26 May 1926.	8	52′	4″	1,000	36′	1,500
3 June 1926.	6	52′	6″	500	8′	1,500
8 June 1926.	7	69′	4″	500	5′	1,500
11 June 1926.	3	48′	6″	225	6′	1,225
17 June 1926.	3	6′	4″	....	....	1,000
25 June 1926.	8	30′	6″	....	....	1,000
....	....	36′	....	....	....	....
....	....	33′	....	....	....	....
2 March 1926.	25	59′	4″	*Nil*	2′	250
27 March 1926.	19	90′	4″	250	4′	1,250
10 October 1925.	8	4′	4″	....	15′	....
20 December 1925.	10	18′	4″	1,000	15′	1,500
3 January 1926.	3	10′	4″	500	10′	500
17 January 1926.	10	74′ tube well.	4″	....	....	Sufficient for hand pump.
16 February 1926.	13	37′	4″	1,000	21′	2,000

APPENDIX

Serial No.	Name of the well or Land owner	Water level after boring	Increase of water supply	Flat charges
	Bores done in 1925-26—contd.			Rs. a.
	Surat District—contd.			
3	Cotton Spinning and Weaving Mills ..	30′	1,000	68 0
4	Mr. Ghelabhai Paragji	15′	1,000	137 0
5	Cotton Spinning and Weaving Mills ..	Katchha well.	1,000	53 0
6	Do. do. ..	....	....	....
7	Mr. Lalbhai Bavabhai	21′	....	....
8	Do.	17′	....	....
9	Mr. Naranji Gandabhai	10′	....	....
10	,, Duriabhjbai Ranchhodji ..	17′	1,000	18 0
11	Do.	17′	1,000	33 0
12	Mr. Maganlal Chunilal	9′	....	....
13	Sonsak Ginning Society ..		Failure as saltish	
14	Shah Vajechand Chhaganlal ..	10′	....	....
15	Desai Kalyanji Gopalji	36′	500	53 0
16	Mr. Uttamchand Kilachand ..	8′	1,000	53 0
17	Mr. Dolatrai Naranji	6′ 6″	1,000	78 8
18	Sheth Nanubhai Bhaidas ..	8′	1,000	48 0
19	Desai Gopalji Ranchhodji ..	....	1,000	15 0
20	Sheth Pirojshaw Vicaji Bhiladwala ..	....	1,000	30 0
21	Sardar Faramroz B. Garda ..	....	....	....
22	Sheth Piroshah Vicaji Bhiladwala ..	....	....	....
1	Sheth Bagubhai	10′	250	....
2	Do.	4′	1,000	110 0
	Panch Mahals District			
1	Mr. Bhagwanlal Ganesh ..	15′	....	....
2	Punamchand Jethalal	15′	500	18 0
3	Jhaveri Kalidas Dayal	10′	....	....
4	Do.	50′ water in bore.	500 sufficient for hand pump.	86 0
5	Do.	21′	1,000	37 0

F—*contd.*

Cost of pipes and shoes	Labour charges	Cost of fuel, Lubricating oil, coal, etc.	Total cost	Cost per foot	Result
Rs. a. p.	Rs. a.	Rs. a.	Rs. a. p.	Rs. a. p.	
70 12 0	91 0	23 4	253 0 0	4 1 3	Successful.
162 0 0	90 0	20 0	409 0 0	3 12 7	Do.
92 0 0	78 0	22 4	275 4 0	4 9 6	Do.
....	....	....	....	....	Incomplete.
28 8 0	30 0	15 0	73 8 0	5 7 9	Failure as tool cannot work further.
....	50 0	15 0	65 0 0	0 11 0	Failure as boring tools left in the bore hole.
16 10 8	15 0	8 0	39 10 8	2 3 3	Failure tool cannot work further.
4 11 0	14 0	19 4	55 15 0	3 1 9	Successful.
7 13 0	20 0	34 8	95 5 0	2 14 0	Do.
....	78 0	25 0	103 0 0	0 15 0	Unsuccessful.
water tapped.					
....	78 0	25 0	103 0 0	1 8 3	Unsuccessful.
105 0 0	30 0	10 0	198 0 0	3 13 0	Successful.
65 0 0	27 0	24 4	169 4 0	3 4 0	Do.
130 8 0	17 0	11 4	237 4 0	3 7 0	Do.
....	6 0	12 0	66 0 0	1 6 0	Do.
9 0 0	15 0	10 0	49 0 0	8 2 8	Do.
....	40 0	18 0	88 0 0	2 15 0	Do.
....	....	....	....	....	Incomplete.
....	....	....	....	....	Do.
66 0 0	112 0	42 0	220 0 0	3 11 8	Failure as water tapped less than half kos.
15 0 0	63 0	36 8	224 8 0	2 8 2	Successful.
....	30 0	10 0	40 0 0	5 0 0	Tool cannot work further failure.
42 0 0	30 0	15 0	105 0 0	5 13 4	Successful water cannot be tested metter pump as it is not fixed.
....	12 0	5 0	17 0 0	1 11 0	Failure.
15 0 0	40 0	23 4	164 4 0	2 3 6	Successful.
7 0 0	70 0	33 12	147 12 0	4 1 0	Do.

APPENDIX

Serial No.	Name of the well or Land owner	Taluka	Village	Date of commencement
	Bores done in 1925-26—concld.			
	Panch Mahals District—contd.			
6	Jhaveri Kalidas Dayal ..	Halol ..	Manipur ..	18 February 1926.
7	Local Board well ..	Do. ..	Pratappura ..	16 March 1926.
8	Mr. Keshavlal Mulji ..	Do. ..	Halol ..	11 April 1926.
9	Do. do. ..	Do. ..	Do. ..	29 April 1926.
10	Patel Shankerbhai Narsibhai ..	Kalol ..	Raninath Muvada.	15 May 1926.
	Broach District			
1	Mr. S. B. Modi Surat ..	Broach ..	Nikora, ..	26 November 1925.
2	,, Kasam Asmal ..	Ankleswar ..	Diva ..	16 January 1926.
3	,, Amtharam Purshottam ..	Do. ..	Ankleswar ..	9 February 1926.
4	Do. ..	Do. ..	Do. ..	10 March 1926.
5	Do. ..	Do. ..	Do. ..	3 April 1926.

F—*contd.*

Date of completion	Actual No. of working days	Total depth of boring	Diameter of bore	Water before boring in gallons per hour	Water level before boring	Water after boring in gallons per hour
9 March 1926.	10	54′ Tube well	4″	....	....	Sufficient for hand pump.
8 April 1926.	15	47′	4″	....	1′	1,000
28 April 1926.	16	54′	4″	....	10′	1,000
12 May 1926.	13	38′	4″	1,000	10′	1,500
....	....	23′	....	....	....	....
2 January 1926.	15	46′	4″	1,000	8′	3,000
3 February 1926.	10	41′	4″	500	8′	1,500
8 March 1926.	16	75′	4″	1,000	15′	2,000
30 March 1926.	10	17′	4″	1,000	15′	1,500
30 April 1926.	17	27′	4″	1,000	10′	1,000

APPENDIX

Serial No.	Name of the well or Land owner	Water level after boring	Increase of water supply	Flat charges
	Bores done in 1925-26—concld.			Rs. a.
	Panch Mahals District—contd.			
6	Jhaveri Kalidas Dayal	31′ water in bore.	500 sufficient for hand pump.	56 0
7	Local Board well	7′	1,000	47 0
8	Mr. Keshavlal Mulji	10′	1,000	56 0
9	Do.	10′	500	38 0
10	Patil Shankerbhai Narsibhai ..	....	....	....
	Broach District			
1	Mr. S. B. Modi, Surat	8′	2,000	46 0
2	,, Kasam Asmal	8′	1,000	41 0
3	,, Amtharam Purshottam ..	20′	1,000	87 8
4	Do.	15′	500	17 0
5	Do.	10′	....	....

F—*contd.*

Cost of pipes and shoes	Labour charges	Cost of fuel, Lubricating oil, coal, etc.	Total cost	Cost per foot	Result
Rs. a. p.	Rs. a.	Rs. a.	Rs. a. p.	Rs. a. p.	
60 8 0	45 0	24 14	195 6 0	3 9 10	Successful.
7 0 0	40 8	30 8	125 0 0	2 10 7	Do.
10 8 0	64 12	27 4	158 8 0	2 15 0	Do.
10 8 0	38 2	19 4	105 14 0	2 12 2	Do.
....	....	....	....	....	Incomplete.
99 0 0	48 0	17 12	210 12 0	4 8 0	Successful.
78 4 0	63 14	8 13	191 15 0	4 10 11	Do.
120 12 0	90 12	11 4	310 4 0	4 2 0	Do.
48 4 0	45 12	7 4	118 4 0	6 15 3	Do.
....	51 0	20 0	71 0 0	2 10 0	Failure.

APPENDIX G

Summary of work done under the Deputy Director of Agriculture, Konkan, during the year 1925-26

General

Charge.—The undersigned continued to be in charge of the Division throughout the year except from 10th April to 10th of June when he was on leave and during which period Mr. C. S. Patel officiated.

2. *Lines of work and organisation.*—The changes of importance are :—

(1) Taking up of Investigations in Mango flower blight with the funds so kindly provided from Sir Sassoon David Trust.

(2) The transfer of Mundgod Peta and Halyal taluka of the Kanara district and one Graduate demonstrator in charge to the control of the Deputy Director of Agriculture, Southern Division.

(3) One more Agricultural Graduate allotted to this Division for propaganda work. He has been used as a second Overseer in the Thana District.

(4) Making available the part-time services of the Agricultural Overseer for Betta inspection under the Revenue Department in Kanara for carrying on Agricultural propaganda in Sirsi and Yellapur talukas.

3. *Staff.*—The strength of the superior technically educated staff of assistants stood in the year at nine for Research and experiment, seven for Extension and propaganda including part-time services of the Agricultural Overseer for Betta Inspection in Kanara under the control of the Revenue Department, and one for Agricultural Education ; the increase by two under Research and Experiment is due to one post of graduate field-man kept in abeyance having been filled for the purposes of Mango Investigation and a post of Mango Investigator provided from Sassoon David grants, and the increase by one under Extension and Propaganda is due to the addition of the post of the one additional Overseer referred to under paragraph 2 above.

4. *Cost of the year's work.*—The total expenditure of the Division amounted to Rs. 1,09,513 as against Rs. 1,05,338 of the previous year, the distribution under each broad division of activities being Rs. 34,495 for Research and Experiments, Rs. 43,948 for Extension and Propaganda including boring and grants to Taluka Development Associations, Rs. 11,775, for Agricultural Education and Rs. 19,315 for direction and superintendence.

The cash receipts during the year amounted to Rs. 4,660 against Rs. 8,634 of the previous year.

5. *Physical and other conditions influencing the agriculture of the year.*—The rainfall of the year commenced about a week earlier than normal with unnecessarily heavy and continuous fall which spoiled the rice seed beds very badly. There was then a long break but subsequently the falls were reasonable for rice. Thus only fair crops of rice were obtianed while on the coast they were about $\frac{3}{4}$ of the average. The rabi

season was also somewhat unusual owing to frequent occasional showers and cloudy weather. The water supply in wells became scanty at the end of the fair season. The mango crop, following a bumper one of the last year, was only about 10 per cent. of the normal.

As regards pests and diseases, there has not been anything specially unusual during the year over what has been mentioned in the previous report.

6. *Results of the year.*—These are summarised below under main headings.

Research and Experiment

7. *Researches into the increasing of yield or bringing about the economy in the cultivation of rice by methods other than breeding.*—The physiological factors which contribute towards making up the yield, and the best and most economic ways to influence their action have been under an intensive and exhaustive study at Karjat Rice Research Station for the last six years. The rice experimental work at Kumta was continued to supplement the work at Karjat in order to represent quite different sets of conditions of soil and climate.

The year's work at Karjat has confirmed the indication of last year about the directions in which the size of the earhead can be increased without decreasing or even with increasing their number per unit area. Giving sulphate of ammonia at different stages of growth of the rice plant promises to be of practical value and application. Organic nitrogen has also the power of increasing this size.

The total water requirements of the rice plant, determined last year to be 600 times of the dry matter, have been again confirmed by this year's work. Once the soil is saturated with water, the rice crops do not show much differences in the different periods of drying up to six days, under soil conditions represented by Karjat. The occasions of prolonged periods of breaks in the rains seem therefore to be one of the factors of reduced yields in certain seasons.

The only additional results of importance obtained at Kumta over confirming those of the past year are that bonemeal is not effective in ill-drained water-logged low-lying rice fields and that liming makes the green or dry leaves and mineral superphosphate more effective. Kumta soils have been found by the Agricultural Chemist to be distinctly acid. This acidity appears to be the cause of all the indifferent results obtained in the past at Kumta with all the new manures except bonemeal.

8. *Other Experiments on rice.*—The suitability of Karjat No. 79 of *Kolamba* strain as a high yielder up to 15 per cent. in upland conditions of the Ratnagiri district has been widely confirmed by this year's results. In a casual trial at the Ratnagiri Farm, 8,000 lbs. per acre of green matter of wild indigo has given increased yields by 90 per cent. Trials of bone superphosphate were carried on at several places at the request of Dharamsi Morarji Chemical Company; in Ratnagiri, bone superphosphate has proved to be superior to bone-meal on the uplands, while on the trap soils of the North Konkan favourable and unfavourable results are about half to half. Complete fertilizer for rice of the Union Agency

was also similarly tried in the Sangameshwar taluka of the Ratnagiri district with favourable results.

9. *Selection and Breeding of higher-yielding strains of rice for the South Konkan.*—The work started at the Ratnagiri Agricultural Station underwent its third year's course of isolating the most promising strains. Amongst the group of the earlies, out of the many which had yielded up to 35 per cent. higher than the local, six or seven have remained consistent with the past year with an increase of 20 to 37 per cent. Amongst the group of late ones the borer attack which was even severer than last year has greatly vitiated the results but those two or three strains which being the earliest of the late group had given increased yields last year have also stood high this year. All these are ready to be tested on a field scale. The cultures being from plants bagged successively for two years now are breeding pure. Nine strains out of this late group have shown a marked resistance to borer and will be further watched for this character.

10. *Remedial measures against Rice Land Crabs.*—Poison baits of Paris green made up with boiled rice and some animal matter such as earthworms, grass hoppers or flesh have been found to be effective in the field trials, the cost per acre working out about Rs. 7. Carbon bisulphide at the rate of about a tea-spoonful per hole has been found to be even more effective at the cost of Rs. 7 per acre and can be applied at any time from the beginning of the monsoon to the time the land cracks by about December after the harvest of the rice crop. These are now ready to be tested and demonstrated on a very large scale. Petrol is effective too but is more costly. Calcium cyanide, formalin and steam appear to be very promising.

11. *Selection and breeding of higher-yielding strains of Nagli (Eleusine Coracana).*—This is being done at Hatkhamba Varkas Land Sub-Station ten miles east of Ratnagiri. The year of report is the fifth of taking up this work. Owing to an accidental fire and consequent burning of buildings, all the original records have been destroyed. But from periodical reports sent to the Deputy Director of Agriculture, it is quite evident that E 31, which has stood first in all the past years remained so this year in the cultures as well as under field trial, giving an average increase of 33 per cent. of seven repetitions. There are half a dozen more strains which closely follow E 31 but do not show good consistency with their past behaviour, which may be due to the effect of seasons. The E 31 strain was also given out to cultivators at different places. The results in the western third strip of Ratnagiri district in which the *warkas* lands are very poor and are invariably manured with fish manure and in which our breeding station is situated confirm our results, but in the eastern one-third where the lands are comparatively more fertile and are not manured, our improved strain did not give an advantage.

Some of the crosses successfully made have been lost in the fire and the work has to be begun afresh. Very luckily the produce of our different strains were stored away from the buildings and have been saved from destruction.

12. *Experiments in increasing the yields and profits from cocoanuts in Konkan.*—A mixture of 4 lbs. of bone-meal, 2 lbs. *undi* cake, 2 lbs. fish, 2 lbs. denaturalised salt, and 2 lbs. of sulphate of potash has increased the yield of nuts by 50 per cent., leaving a net profit of 8 annas per tree.

The two dwarf and reputed varieties from Malaya States and Cochin planted two years ago on the Kumta Farm have fallen a victim to the Rhinoceros beetle.

The enormous proportion (70 per cent.) of drop of immature buttons and nuts noted last year has been found to be general under different conditions of gardens or ages of plants and the question is being gone into to find the causes and if any of them can be economically remediable.

13. *Best way of utilizing bare minor forest areas for supply of leaf manure.*—This is the fourth year of the experiments on the Kumta Farm. The year's work has not furnished any more species or information about growing them under natural conditions than what has been noted in the previous reports.

14. *How to make the leaf manure of some of the commonly found and used species more readily available.*—Leaf of some such shrubs has been found not to decompose in one year or even more so as to be useful for the crops when it has to be applied to the land without using as litter. We have succeeded in effecting their thorough decomposition in two or three months' time by the use of sulphate of ammonia keeping the stuff adequately moist and stirred. The most economical and effective quantities and other cheaper substitutes to be used have yet to be determined.

15. *Onion leaf blight disease in the South Konkan.*—This has been noted as a very serious impediment to the further and rapid extension of this very profitable crop. The investigations of the disease and remedial measures have been resumed on the Kumta Farm. *Alternaria* species of fungus which is supposed to be the cause has been found to generally follow an infestation of thrips, suggesting that a prompt and wholesale control of thrip may avert the fungus disease and consequent loss of crop. Breeding of disease-resistent strains has also been commenced.

16. *Investigation of the mango-flower blight.*—The mango is our premier fruit crop and there is a very urgent need of special investigations. One of our most serious difficulties is the mango-flower blight which reduces the yield to an extent which varies from 25 per cent. in a good year to 75 per cent. when the damage is particularly serious. This blight has so far baffled all workers. It is generally connected with a particular insect, the mango hopper. It is always or almost always accompanied by mildew which may or may not be the cause of affection.

It has been possible to undertake really careful scientific study of the problem by the munificent grant of Rs. 5,000 in the first instance so generously made from the Sassoon David Trust Fund. The work has been started since January 1926 at Ratnagiri, the largest centre of high class kinds of mango, under a very able and experienced Investigator, Mr. Wagle, M.Ag.

Very unfortunately, mango flowering was exceedingly shy in the last season being about 10 per cent. of a normal one. The flowering morever commenced late and the mango hopper which is supposed to be the cause was rare, although mildew which is also associated with the blight was present. Still, flower heads for our experimental purposes were artificially infested with hoppers collected with great difficulty. All the observations thus made, and data collected have not yet afforded sufficient evidence to establish the connection between the blight and the hopper, although they show some connection between the blight and the mildew. Spraying with crude oil emulsion has itself been found to be harmful to the flowers, although it is able to kill the hoppers most surely. Spraying with Bordeaux mixture against mildew has similarly been found effective in preventing the damage from it if done after the setting of the fruit, that done earlier being somewhat harmful to the setting. A mass of observations about the number and the fate of the hermaphrodite flowers under several categories has been collected, recorded and analysed with a view to determine all the possible causes of the blight besides the above two obviously found associated with it. Another season's work particularly with the usual hoppers found normally is necessary to warrant any inferences.

Extension work

17. This consists in bringing into the practice of the agriculturists, agricultural improvements found to be profitable and suitable for the various localities. This is carried on by the itinerant district propaganda staff called Agricultural Overseers through (*a*) Departmental Kamgars, (*b*) Taluka Development Associations and (*c*) Co-operative Societies, all further assisted by the Revenue staff under the scheme of co-ordination promulgated by Government circular in January 1925. All the propaganda activities continued to be controlled by the Konkan Divisional Board.

18. *Work of the Konkan Divisional Board.*—The Deputy Director of Agricultural, Konkan, continued to be the Chairman of the Board throughout the year. All the quarterly meetings were held. The non-official members on the Board during the year were as follows :—

Representatives of Agricultural movement.	1. Mr. V. V. Nilekani of Sirsi District, N. Kanara.
	2. Mr. K. T. Karulkar, Umbergaon, upto the end of October 1925.
	Rao Bahadur D. A. Vichare, Varveli, taluka Chiplun, district Ratnagiri, after the end of October 1925.
Representatives of Co-operative movement.	3. Mr. V. V. Athalye, Shiposhi, taluka Sangameshwar, district Ratnagiri.
	4. Mr. V. K. Sanjanwala, Umbergaon, district Thana, upto the end of October 1925.
	Mr. Shankarrao Zunzarrao, Kalyan, district Thana, after the end of October 1925.

In addition to the administrative work of laying down the policy and controlling agricultural and co-operative propaganda, the Board considered many important subjects of agricultural and co-operative developments. These together with the recommendations of the Board and results thereof upto the end of the year are given in the following statement :—

Serial No.	Recommendations of the Board	Progress upto the end of the year
1	Special grant to Dapoli Association for pig killing and revival of rewards for pig killing in Ratnagiri district.	Sanctioned through the Revenue Department.
2	Relaxation of the rigour of the existing rules regarding tapping of the date palm trees for gul manufacture in the Thana District.	The Director of Agriculture has requested Government to re-examine the matter by appointing a small committee.
3	Special concession rates for the conveyance of concentrated manure by Railways.	B. B. and C. I Railway has sanctioned a reduction in rates.
4	Increase of Government subsidy to Taluka Development Associations.	Bombay Provincial Board of Agriculture held in August 1925 has recommended to Government to increase its maximum limit from Rs. 1,000 to Rs. 2,000 and make it twice the amount collected locally.
5	Mr. Tambe Shastri's request for a piece of Government waste land in the Ratnagiri District for developing into a model forest.	Collector of Ratnagiri replied that the land in question is not to be given out to any one at present.
6	More adequate travelling allowance to non-official members of the Divisional Boards.	Government have refused to treat non-official members of the Divisional Boards as first class officers.
7	Need, scope and methods of improvement of cattle in Konkan.	The report of the Committee appointed by Government and Government orders thereon meet the requirements of the Konkan Division.
8	Need for granting long term loans for land improvement through Revenue Department even in places of Co-operative Societies where owing to strictness of enforcing large securities the Provincial Co-operative Bank is not prepared to sanction the same.	Provision has been made by Government in the revised rules.
9	Supply by the Agricultural Department of copies of "Konkan Sheti Samachar" sumarising the proceedings of the Konkan Divisional Board to the Honorary Co-operative Organisers in order to keep them in touch with the business of the Divisional Board.	No remarks by the Joint Board and hence to be understood as accepted.
10	Need for a low rate of interest for long term Land Improvement in Konkan.	The Joint Board does not think that a case has been made out for the grant of long term loans at a low rate of interest in the Konkan districts. Special cases called for to convince the Joint Board.

Serial No.	Recommendations of the Board	Progressive upto the end of the year
11	Furnishing non-official members of the Board with programmes of tours of propaganda officers of Agricultural and Co-operative Departments in their respective districts and arrangements for interviews with them in visits to their headquarter stations.	No remarks by the Joint Board and hence to be understood as accepted.
12	Supply by the Deputy Director of Agriculture, Konkan, of copies of "Konkan Sheti Samachar" to the members of the Divisional Board.	Do.
13	Investigation by the Deputy Director of Agriculture, Konkan, of the possibilities and scope for the cultivation of indigo and suran, the economical use of *takala* seed, ambehalad.	Do.
14	Non-practicability of dynamiting laterite rock plateux for making rice fields.	Do.
15	Necessity of magic lantern in each district for agricultural propaganda.	Do.
16	Special concession rates for the conveyance of town sweepings, sheep and cattle manure, etc., by Rail from Bombay for agricultural purposes.	A committee of the Deputy Director of Agriculture, Assistant Registrars, C. S., Bombay. and Messrs. Karulkar and Sanjanwala appointed to consider any further action.
17	Necessity of supplementing the present stock of boring machines in the Thana District.	The Joint Board of the Director of Agriculture and the Registrar, C. S., replied that more boring machines are being obtained and sent to districts where they are most needed.
18	An experiment of hunting parties in the Kanara District for the destruction of wild pigs damaging crops.	The Joint Board replied that this does not at present seem to be practicable.
19	Improvising measures for the protection of crops from wild animals.	The report of the Committee appointed by Government and Government orders thereon meet the requirements of Konkan generally.
20	Grant of Rs. 120 to Ratnagiri Mango sale Co-operative Society for carrying on propaganda.	Not sanctioned by the Registrar, C. S., Poona.
21	Subvention to Kumta Betelnut Sale Society.	Sanctioned by the Registrar, C. S., B. P., Poona.
22	Forwarding for opinion of the Deputy Director of Agriculture, Konkan, and Assistant Registrar, C. S., Bombay, a proposal for a paid agricultural organiser for Non-credit Agricultural Co-operative Societies in the Ratnagiri District sent by the Second Sangameshwar Taluka Co-operative Conference.	Opinions awaited.

Serial No.	Recommendations of the Board	Progress upto the end of the year
23	General permission to the Government officers to collect subscriptions for the recognised Taluka Development Associations and co-operative institutes.	Joint Board's reply awaited.
24	Appointment by the Bombay Central Co-operative Institute of a special propaganda officer for Ratnagiri District in order to remove the complaint from the district of inadequate attention by the Institute.	Reply awaited.
25	Scope for conversion of *warkas* lands and reclamation of *khajan* lands into rice fileds in the Ratnagiri District and justification of a low rate of interest on such schemes.	Do
26	Necessary action by the Collector of Ratnagiri on standardzing the weight and measure for sale of fish manure in the Ratnagiri District.	Do.
27	Consideration by the Presidency Agricultural Show Executive Committee of the facility of sending some 2 or 3 *bona fide* cultivators in the Karwar taluka to see the Agricultural Exhibition at the expense of the show funds.	Do.

19. *Staff.*—The staff available of the Agricultural Department is two Overseers for Thana, one for Kolaba, one for Ratnagiri and two (one part time under Revenue Department) for Kanara with one Kamgar each, the last three having each a fieldman or store-keeper in addition.

20. *Co-ordination of Revenue and Agricultural Departmental staff for carrying on agricultural propaganda.*—This was done as much as possible according to the provisions of the Government Circular. The prescribed annual meetings were held with the Officers of the Revenue Department and members of the Local Boards for all the districts of the Konkan Division except Kanara to discuss and adopt the programmes of improvements and the nature of assistance the Revenue Department can render. Distribution of improved strains of rice in the Thana and Kolaba districts and spraying against *koleroga* in the Kanara district were the items in which the assistance of the Revenue Department was specially sought for and has been useful to some extent. It has been found that the Mamlatdars have not generally taken as serious and systematic an interest as they could have done.

21. *Items of propaganda.*—The detailed items of improvements proved to be worth introducing which have formed the activities of the year are the same as given in the last annual report (*vide* paragraph 24) with ommissions and additions mentioned at the end of the paragraph.

22. *Résumé of Results.*—The résumé of progress obtained at the end of the year under the items specified above is as follows :—

For the purpose of bringing the various improvements to the notice and into the practice of cultivators, the demonstration plots on cultivators' fields numbered as follows in comparison with those of the last year.

Year	Thana	Kolaba	Ratnagiri	Kanara	Total
1924-25	27	28	28	161	244
1925-26	61	10	75	265	411

The year has added its quota to the progress under the various items with more or less rapidity as they fit in with the economic and temperamental conditions of the people to a more or less degree.

(*i*) The higher yielding strain No. 42 of *Kolamba* rice, the distribution operations of which were extended to cover a new area of about 3,400 acres in the Karjat, Pen and Panwel talukas of the Kolaba district and Kalyan, Murbad, Shahapur and Mahim talukas of the Thana district has maintained its increase of 20 to 25 per cent. and is becoming popular. It is estimated that automatic spread might have been brought to 65,000 acres in all the tracts taken up.

Karjat taluka in which the distribution operations were carried on for three years now is almost wholly occupied by the new strain.

The early strain *Kolamba* No. 79 was distributed and has found favour in the Umbergaon peta of the Thana district over an area of 100 acres and has been found to be suitable and giving higher yields in the uplands of the Ratnagiri district.

Arrangements have been made to repeat the operations in the same areas and extend the same to Bhivandi, Dahanu, Wada and Bassein.

By some actual tests the so-called non-*Kolamba* tract of the Kolaba district has also been found to be hopeful and so further and more extended tests will be carried on on cultivators' fields there.

(*ii*) Sulphate of ammonia as a substitute of *rab* for irce, in places where a deficiency of the latter is felt has impressed the rice cultivators of the North Konkan, most and there is a great rush of demand for the same at all our depôts for the season just commenced.

(*iii*) Bone meal manure for rice in the laterite districts of Ratnagiri and Kanara is going forward but slowly, the reasons being that it has not shown highly striking results under all conditions and that the small tenant cultivators of rice do not think the advantage to be enough to go in for it with borrowed capital.

(*iv*) Spraying against *koleroga* (mildew) disease of betelnut in Kanara has continued to receive an enthusiastic response and 100 acres were sprayed against 35 acres of the previous year.

(*v*) Artificial manures are fast gaining in popularity in the garden cultivation in the Thana district owing to the high prices for oilcake and cheapening of artificials; 50 acres having adopted these of actual value of Rs. 2,500.

(*vi*) The labour saving methods of planting garden crops in rows and thus enabling the use of less expensive bullock power implements for ridging, weeding and interculturing have appealed to the market gardeners of the Thana garden tract.

(*vii*) The effect of the Surati buffalo breeding bulls maintained at Ratnagiri and Kumta farms has now been visible on the progeny and they are being used as widely as possible.

(*viii*) The progress secured by the general propaganda consisting of dissemination of general knowledge of improved methods of agriculture giving advice, answering querries by means of lecture, talks and discourses and magic latern shows in tours, is summarised in the following statement :—

District	Number of villages			Number of people				
	No. got in touch during the year		Progressive total by the end of the year	Come in contact during the year			Progressive total by the end of the year	
	Total	New		Total	New	Taking up or likely to take up improvements	Total	Number that has taken or likely to take up improvements
Thana	107	64	227	905	789	400	934	460
Kolaba	350	80	576	2,500	400	320	4,731	3,009
Ratnagiri	65	22	97	1,500	400	100	1,623	163
Kanara ..	306	55	528	2,595	710	320	8,982	3,707
Outside the Konkan Division.	8	..	37	25	8	..	..	..
Total ..	836	221	1,465	7,525	2,307	1,140	16,270	7,339

The following items have been now sufficiently popularised so that no further propaganda is necessary in them :—

Kanara District.—(1) Mass selection of rice seed, (2) Red Mauritius variety of sugarcane, (3) Improved sugarcane crushers, (4) Poona pans and furnace, (5) Onion cultivation together with top-dressing with concentrated manures.

It has been conclusively proved that the following do not at all fit in with the agricultural, economic and temperamental conditions of the people, or are not of sufficient wide spread application and there is therefore no need to go on further with them as separate items.

Thana.—(1) Manuring of plantains with a mixture of nitrate of soda and superphosphate, being included in the general heading use of artificial manures for garden crops.

Ratnagiri.—(1) Sabul plough, (2) Mot water lift, (3) Poisoning of wild animals, (4) Improved poultry breed.

Kanara.—(1) Manuring rice seed beds with comentrates, (2) Widor planting and more economic tillage by sabul plough in sugarcane.

The experimental work or further expansion of the sphere of activities has made it possible by the end of the year to take the following new items of improvements which will be included in the programme of propaganda work from the next year.

Thana.—(1) Sulphate of ammonia as a substitute for *rab* for rice; (2) sulphate of ammonia as a field manure for rice; (3) Use of Deccan blade harrow for puddling; (4) (*a*) Groundnut, (*b*) sweet potato, and (*c*) hill variety of paddy on *warkas* lands; (5) Denaturalised salt for manuring cocoanut and mangoes; (6) *Parwar* cultivation.

Kolaba.—(1) Artificial manures for garden crops; (2) Green manuring with *san* for *nagli*; (3) (*a*) Groundnut, (*b*) sweet potato; and (*c*) hill variety of paddy on *warkas* lands; (4) Denaturalised salt for manuring cocoanut and mangoes; (5) *Parwar* cultivation.

Ratnagiri.—Spraying against *Gal* (*Koleroga*) disease of betelnut and betelnut palms, (2) Manuring of grafts with bonemeal.

Kanara.—(1) *Halga* variety of rice in upghat talukas, (2) propping of sugarcane with wires, (3) Cheap wooden Persian-wheel water lifts.

All districts.—(1) Use of night soil for manure, (2) testing of improved *nagli* strains selected at Hatkhamba *warkas* station.

23. *Arrangements to supply implements, manures, seeds and other articles.*—In order to meet the demands which are created as a result of the propaganda work for articles before they are an ordinary market commodity, the organisation for sale and hire depôts and free agency work for arranging supply of others direct from the firms were continued; bonemeal manure, sulphate of ammonia, Meston plough, Poona gul boiling pans, and sugarcane mills, spraying and spraying materials and mango grafts were the most important of the articles thus dealt with amounting to a total value of Rs. 32,300. Arrangements to supply denaturalised salt for manurial purposes duty free were continued.

24. *Well boring for cultivators.*—Three of the power machines and one hand machine were allotted to the Thana district where there has been the greatest success and demand for well boring while one hand machine has been allotted to each of the remaining three districts in which boring is yet in an exploratory stage. The total number of bores made in the year is 47 out of which 8 are incomplete, 13 unsuccessful and the rest successful. The total footage bored during the year amounted to 2,200 feet on one-third days of actual work out of the whole year against 1,662 feet on one-fourth days of the previous year.

The statement of detailed information prescribed in Government Resolution No. 7075, Revenue Department, dated 5th May 1925, is appended separately.

The capital and nett expenditure on well boring during the last financial year amounted respectively to Rs. *nil* and Rs. 15,470 and the receipts to Rs. 3,191.

This year's work is an improvement over that during the previous year, on account of no machine being out of work for conversion to power. The works in the Kolaba, Ratnagiri and Kanara districts are still under exploratory stage and the orders being few and far between, a good deal of time is wasted in transport and non-supply of labour although Kolaba shows some progress. The greater quantity of work is some what also due to better administration and organisation brought about by the replacement of the former Boring Assistant. The demand in Thana is more than the number available can cope with and at least one more power machine can be easily fully occupied.

Local Non-Official Organisations

25. *Taluka Development Associations.*—Only one more association of the Umbergaon peta in the Thana district was registered during the year; some other talukas have expressed a desire to form them being yet waiting for the survey of their agricultural possibilities by the Agricultural Department or for ascertaining the guarantee to raise the local share of contributions for at least five years' expenditure. The associations at the end of the year, thus stand as below, showing the amounts of Government subsidy received by each during the year.

Thana.—Mahim Rs. 900, Kalyan *nil*, Umbergaon Rs. 500.

Kolaba.—Alibag under suspension as it is unable to raise sufficient local contribution.

Ratnagiri.—Ratnagiri 500, Dapoli Rs. 700, Rajapur Rs. 960.

Kanara.—Karwar Rs. 352, Sirsi Rs. 1,000.

All of them have employed *Kamgars* of their own, mostly good selected men passed from the Vernacular Agricultural Schools, and have followed good programmes of agricultural propaganda suitable for the respective talukas under the advise and direction of the Agricultural Department. The progress achieved is poor in Umbergaon, Kalyan, Alibag and Dapoli and good in the rest. They have hardly done anything in the matter of agricultural co-operation, the main reason being that the one fieldman whom they can at the most afford to employ has more than full work in agricultural propaganda and besides a paid man of the status and knowledge of a passed boy from the vernacular agricultural schools can hardly possess the necessary influence required to stimulate co-operative organisations. The office bearers and the members of the managing committee may be able to do something in this direction.

The financial condition in respect of the local share of contributions is not yet stable in any of the associations—Kalyan, Alibag, Karwar are deplorably deficient while the rest are just keeping themselves going. The number of co-operative societies is too small in the Konkan to contribute an appreciable share of funds. The fate of the associations in the Konkan appears to be very risky unless the necessity of collecting such large amounts by annual subscriptions in the form of a general cess is found.

The Mamlatdars were on the managements as *ex-officio* Vice-Presidents except at Rajapur in which the Mamlatdar has been elected to be the President. Mr. Joshi, Mamlatdar of Rajapur is following the footsteps of his predecessor in working for the Association whole-heartedly. The interest taken by others is more or less perfunctory.

26. *Stimulation of co-operation for promoting agricultural improvements.*—The Agricultural Propaganda staff are side by side with individual persuasion, also expected to stimulate, investigate, assist and advise, co-operative effort for promoting agricultural improvements. The special paid organiser for agricultural co-operation in Thana, Kolaba and Ratnagiri districts attached to this division since 1923 continued his activities in this direction. The incumbent of the post was a new recruit having only six months' previous training and experience.

In all 27 proposals of investigation and stimulation, 14 new and the rest those continued from the previous years' consisting of 9 enclosure, 4 irrigation, 3 land improvement, 6 agricultural requisite supply, 1 cultivation, 3 sale and 1 cattle breeding received attention during the year; out of these, 14 were dealt with by the Agricultural propaganda staff. Only one scheme mentioned below out of these was completed and resulted in final formation and registration, namely the *Fencing society at Vangni, taluka Kalyan, district Thana.*

The following non-credit agicultural societies have also been registered during the year directly through the efforts of propaganda staff of the Co-operative Department :—

(1) Kumta Agricultural Requisite Supply Society.
(2) Salukatta Dam Construction Society.
(3) Tublakatta Dam Construction Society.

There were thus 23 non-credit Agricultural Societies in the Konkan Division at the end of the year, as against 20 at the end of the last year; all of these were given all possible assistance, advice and supervision to improve them wherever necessary and possible. All except most of the manure Societies in the Thana district are progressing fairly steadily. The Ratnagiri Mango Sale Society has not been able to command the confidence of mango growers and packers.

The Agricultural Organiser had besides in hand the liquidation proceedings of two societies entrusted to him both of which were completed during the year.

The stimulation and working of Agricultural Co-operative schemes is an extremely difficult and slow task requiring in most cases such as enclosure, irrigation, consolidation and cultivation, etc., the combination of each and every person in the block while sale and agricultural requisite supply are confronted with some opposition from the existing interested parties.

Publications

27. The following leaflets were issued in connection with the new recommendations from the division.

Use of wire fence for preventing lodging of sugar-cane in Konkan.

Notes and articles were contributed to the various agricultural and other magazines by the members of the staff of which there were 42 extracts, abstracts and adaptations of information already published before and 24 original ones.

28. *The Konkan Agricultural Magazine.*—The monthly magazine in Marathi devoted exclusively to Konkan agriculture under the name *Konkan Sheti Samachar* commenced by Mr. Y. G. Gurjar of Alibag in the year 1917 and the editing of which was taken over by the Konkan Agricultural staff was regular in publication under the editorship of a committee of agricultural staff at Karjat for which the committee and others who contributed and Mr. Limaye, Proprietor, " Satya Shodhak " Ratnagiri who published the same punctually deserve the best thanks. Its circulation at present stands at 550 copies which is less by 53 copies as compared to the last year.

Agricultural Education

29. *Agricultural Middle Schools in Vernacular.*—The year under report is the ninth year of the Agricultural School at Jambul near Kalyan, district Thana, for giving agricultural education of a primary nature through Marathi primarily for the Marathi speaking Konkan districts.

The year opened with 27 students, 13 in the first year and 14 in the second year. This number is more by two than that of the last year. At the end of the year however, two from the first year dropped out. Twelve of the senior class and 9 of the junior class passed in the annual examination.

The total expenditure of the school including the teaching staff and free boarding expenses amounted to Rs. 11,284 and the total receipts to Rs, 1,983 as against Rs. 12,889 and Rs. 2,317 respectively of the previous year.

Out of 64 boys, turned out successful from this school up to now, 11 having just passed out have yet to start an occupation, 9 are managing their lands, 10 are in service connected with agriculture, 5 continuing ordinary secondary education, 14 are engaged in business other than that of agriculture and whereabouts of the rest are not traceable.

The number of boys of those carrying on cultivation themselves continues yet to be very small, the absentee land-holders forming the bulk of those availing themselves of agricultural education in this form.

30. *Agricultural Bias Classes in the Rural Primary Schools.*—Three primary school teachers were trained in Agriculture in the Jambul Agricultural School. Agricultural bias classes have now been introduced in three schools in each of the four Konkan districts. These schools are under the control of the Educational Department but all of them were visited by the members of the Agricultural Department, and are making fair progress. This is quite a new and novel departure from the routine system of the primary schools and therefore needs considerable technical direction and supervision in organising the time-tables and methods of instructions of the agricultural teacher.

31. *Training of men for special agricultural purposes.*—Three Kamgars for meeting the demand from private farms or for carrying on agricultural propaganda of Taluka Development Association were trained during the year.

Crop Tests

32. In accordance with Government orders contained in Government Resolution No. 601, dated 21st January 1914, Revenue Department, the graduate staff took during the year crop tests on rice, nagali and sugarcane crops as usual.

Personal

33. All with the exception of one or two have continued to work faithfully and hard to the best of their respective abilities and capacities. Mr. N. B. Limaye, second clerk in my office who was appointed to act as Boring Assistant, improved the working of the boring section considerably even with a handicap of no previous technical knowledge or experience.

V. G. GOKHALE,

Deputy Director of Agriculture,

18th August 1926 Konkan Division.

APPENDIX G

MO Q 35—9a

Annual report of boring work done in the Konkan

Serial No.	Name of the land-owner	Taluka	Village	Diameter of bore	Depth of bore	Water before boring in gallons per hour	Water after boring in gallons per hour
				Inches	Ft. in.		
1	Mr. V. V. Dandekar ..	Mahim ..	Palghar ..	5	115 0	Surface.	1,500
2	Mr. Amir Saheb Race ..	Do. ..	Do. ..	5	22 0	Do. ..	*Nil*
3	Do. ..	Do. ..	Do. ..	5	93 0	Do. ..	1,000
4	Mr. K. M. Shroff ..	Do. ..	Do. ..	5	59 0	Do. ..	Incomplete.
5	Mr. Cawasji Palanji Patel.	Dahanu ..	Bordi ..	4	193 6 22 6	The well was dry.	Salt water was tapped.
6	Mr. Ratanshaw Nasarvanji Gyara.	Do. ..	Gholwad ..	4	62 0	1,500	4,000
7	Mr. Ardesar Cursetji Irani.	Do. ..	Do. ..	5	75 5	500	3,000
8	Do. ..	Do. ..	Do. ..	4	75 0	3,000	6,000
9	Mr. Cawasji Palanji Patel.	Do. ..	Waghmare	4	100 0	3,500	4,000
10	Do. ..	Do. ..	Do. ..	4	32 0	Surface.	Incomplete.
11	Mr. G. R. Samant ..	Mahim ..	Umberpada	3	104 0	*Nil*	*Nil*
12	Mr. D. V. Savale ..	Do. ..	Rotha ..	3	40 0	3,000	8,000
13	Do. ..	Do. ..	Do. ..	3	50 0	Surface.	500
14	Mr. C. R. Shroff ..	Do. ..	Thanapada	3	51 0	1,500	3,500
15	Mr. Madhav Nama Patil .	Do. ..	Mahim ..	3	52 0	800	3,000
16	Do. ..	Do. ..	Do. ..	3	30 6	1,000	6,000
17	Mr. Bhaskar Hari ..	Do. ..	Do. ..	3	47 0	4,000	6,500
18	Mr. G. L. Joshi ..	Do. ..	Kelwa ..	4	61 0	800	1,600

Division during the year 1925-26 ending 30th June 1926

Departmental charges	Labour charges, etc.	Total cost of boring	Cost per foot	Result successful or unsuccessful	General remarks
Rs. a. p.	Rs. a.	Rs.	Rs. a.		
259 8 0	540 0	800	7 0	Successful.	The rock was very hard and the engine and machine were not in good condition. Hence the cost is great. Out of this 93'8" was done last year.
Not charged as abandoned by Department, the bore being one.	About 65 0	About 65	3 0	Abandoned	Boulders were met with in which the rotary machine does not work satisfactorily and the bad condition of the machine and engine caused a greater expenses.
114 8 0	About 400 0	About 515	5 8	Successful	
Incomplete					The work is still incomplete.
Not charged as salt water was tapped.	About 750 0	About 750	3 8	Failure ..	The rock is very hard. The machine worked for 123 days. Out of this 74' was bored last year.
68 0 0	About 120 0	190	3 0	Successful	The strata is soft and so the cost per foot is less.
88 0 0	About 150 0	240	3 0	Do. ..	Do.
87 8 0	About 230 0	320	4 4	Do. ..	The strata here was rather hard and so the progress slow, which increased the cost per foot.
125 0 0	About 125 0	250	2 8	Do. ..	The strata is very soft and hence cost per foot is low.
		Incomplete			Work still incomplete.
Not charged as it was a failure.	About 450 0	450	4 5	Failure ..	The strata was hard and hence greater cost per foot even though a failure.
40 0 0	About 50 0	90	2 4	Successful	Out of this 63' 4" only was done last year. The strata is much soft and hence cost per foot is less.
50 0 0	About 70 0	120	2 8	Do. ..	Do.
51 8 0	About 80 0	130	2 8	Do. ..	Do.
53 0 0	About 90 0	140	2 10	Do. ..	Do.
30 8 0	About 45 0	75	2 8	Do. ..	Do.
47 0 0	About 50 0	97	2 0	Do. ..	Do.
66 8 0	About 85 0	150	2 8	Do. ..	Do.

Serial No.	Name of the land-owner	Taluka	Village	Diameter of bore	Depth of bore	Water before boring in gallons per hour	Water after boring in gallons per hour
				Inches	Ft. in.		
19	Mr. G. L. Joshi ..	Mahim ..	Kelwa ..	4	40 0	1,600	2,000
20	Do. ..	Do. ..	Do. ..	4	101 0	500	600
21	Church of Brethren Mission.	Do. ..	Palghar ..	4	29 0	Surface.	Incomplete
22	Chitnis, Gowgrass Bhiksha.	Kalyan ..	Patherli ..	3	40 0	*Nil*	*Nil*
23	Mr. N. G. Navare ..	Do. ..	Dombivali ..	3	47 6	1,000	1,000
24	Mr. S. S. Likhite ..	Do. ..	Do. ..	3	81 0	....	....
25	Mr. N. R. Patkar ..	Kalyan ..	Do. ..	3	63 0	100	100
26	Mr. N. L. Nakhawa ..	Thana ..	Thana ..	3	19 0	50	500
27	Mr. N. B. Dandekar ..	Salsette	Borivali ..	3	16 0	*Nil*	Incomplete
28	Mr. Akbarali Mahamadali Bohori.	Karjat ..	Neral ..	3	118 0	Surface.	50
29	Mr. S. L. Dev ..	Pen ..	Pen ..	3	31 0	Do. ..	250
30	Mr. T. G. Dev ..	Do. ..	Do. ..	3	20 0	800	1,100
31	Do. ..	Do. ..	Do. ..	3	11 0	200	200
32	Mr. V. S. Dharkar ..	Do. ..	Do. ..	3	28 0	Surface.	250
33	Mr. N. M. Dharkar ..	Do. ..	Uched ..	3	28 0	Do.	Incomplete
34	Mr. Shaik Ahmad Maner .	Do. ..	Pen ..	3	25 6	Do. ..	150
35	Mr. G. B. Raje ..	Do. ..	Do. ..	3	3 0		Incomplete

Departmental charges	Labour charges, etc.	Total cost of boring	Cost per foot	Result successful or unsuccessful	General remarks
Rs. a. p.	Rs. a.	Rs.	Rs. a.		
Not yet billed as the tool which is struck up is not yet extracted.	About 60 0	100 (including Rs. 40 for Dept. charge).	2 8	Successful	The strata is much soft and hence cost per foot is less.
126 8 0	About 193 0	320	3 3	Unsuccessful.	The strata met with here is harder than in other bores of the same place and hence cost per foot is greater.
Incomplete					
No bill preferred the bore being unsuccessful.	About 200 0	200	5 0	Do. ..	The labour being dear the cost per foot is greater. Out of this only 18 feet are done in this year.
Do. ..	About 200 0	200	4 4	Do. ..	Do.
Do. ..	About 200 0	200	2 8	Do. ..	The strata was a bit softer than that of the previous two bores, hence cost per foot is proportionately less.
69 8 0	150 0	220	3 8	Do.	The same as for 24.
19 0 0	130 0	150	8 0	Successful.	The rock was very hard and labour dear. The daily work was not more than 1′ 2″ per day. Hence cost per foot is very great.
Incomplete					
Not charged the bore being a failure.	450 0	450	4 5	Failure ..	The labour is very dear. Hence cost per foot is high.
31 0 0	85 0	116	3 12	Successful.	The cost of transport cost much. Labour was much cheaper (@ 0-6-0). Strata soft.
20 0 0	50 0	70	3 8	Do. ..	
11 0 0	30 0	40	4 0	Failure ..	
28 0 0	50 0	78	2 12	Successful.	
	Incomplete				The bore has been temporarily abandoned as a fissure is met with and the necessary bores are not available.
25 8 0	50 0	75	3 0	Failure.	
	Incomplete				

Serial No.	Name of the land-owner	Taluka	Village	Diameter of bore	Depth of bore	Water before boring in gallons per hour	Water after boring in gallons per hour
				Inches	Ft. in.		
36	Mr. V. A. Bhave ..	Sangmeshwar.	Kalambushi	3	31 4		
37	The Executive Engineer, Kanara.	Kumta ..	Kumta ..	3	95 0	100	Incomplete 350
38	Do. ..	Bhatkal ..	Bhatkal ..	3	22 0	100	100
39	Do. ..	Honavar ..	Honavar ..	3	81 2	100	
40	Mr. Pestonji Bahiramji ..	Mahim ..	Mahim ..	3	7 6	1,500	2,500
41	Do. ..	Do. ..	Do. ..	3	7 0	2,500	6,000
42	Do. ..	Do. ..	Do. ..	3	11 0	2,000	Salt water
43	Mr. Nana Mukund ..	Do. ..	Do. ..	3	18 0	2,000	4,000
44	Mr. Gajananrao More ..	Dahanu ..	Borigaon ..	3	43 0	2,500	3,500
45	Rao Bahadur Y. H. Desai.	Salsette ..	Borivali ..	3	34 0	500	1,000
46	Do. ..	Do. ..	Do. ..	3	62 0	1,500	6,000
47	Mr. N. M. Chandorkar ..	Kalyan ..	Sonarpada	3	55 0		Incomplete

Departmental charges	Labour charges, etc.	Total cost of boring	Cost per foot	Result successful or unsuccessful	General remarks
Rs. a. p.	Rs. a.	Rs.	Rs. a.		
Incomplete			Incomplete		
117 8 0	450 0	570	6 0	Successful	The rock is very hard and hence cost per foot is higher.
22 0 0	45 0	66	3 0	Failure.	
	Incomplete				
3 12 0	10 0	15	2 0	Successful	The bore is taken by a tripod and a Departmental mechanic was supplied.
3 8 0	10 0	14	2 0	Do. ..	Do.
5 8 0	5 8	11	1 0	Failure.	
9 0 0	25 0	34	2 0	Successful	
Not yet charged as the tool which is struck up has not been taken out.	About 90 0	135	3 0	Do.	
11 5 4	About 55 0	68	2 0	Do. ..	These bores are taken by Departmental tripod but without a Departmental man to work.
22 10 8	100 0	124	2 0	Do. ..	
	Incomplete				

APPENDIX H

Annual Report of the Deputy Director of Agriculture, Sind, 1925-26

In view of the limitations imposed by Government to make the annual reports as short as possible the following pages describe only the most important activities of the Department for the year under review.

These activities may be briefly summarised under the following heads :—

(*a*) Organization and Finance.
(*b*) Season.
(*c*) Research and Investigation.
(*d*) Miscellaneous.
(*e*) Propaganda and Service.

Organization and Finance

2. The Imperial Agricultural service is represented by one Officer, the Deputy Director of Agriculture. I held this charge throughout the year.

The Provincial Agricultural service is represented by two Officers, *viz.*, the Divisional Superintendent of Agriculture and the Cotton Breeder. Mr. Jaffurali Ansari continued in the former post throughout the year but Mr. Thadani who held the latter appointment vacated it in February 1926 and took up the position of the Botanist at Sakrand. The post of the Cotton Breeder has been for the present held in abeyance.

3. In addition to the above gazetted appointments, the following staff existed both under Upper and Lower subordinate service :—

12 Graduate Assistants,
19 Non-graduate fieldmen out of which one was vacant,
7 Clerks,
1 Storekeeper,
5 Kamgars,
2 Mechanical Assistants,
3 Engine Drivers.

The above cadre includes the 2 graduate assistants from Lyallpur College appointed on probation during the year.

Mr. Alimahomed Ulvi, B.Ag., having successfully completed his post-graduate course in cattle breeding returned in April 1926.

Mr. Abdur Rehman proceeded on a year's leave on medical certificate from 17th October 1925.

4. The cost for 1925-26 was—

	Rs.
(*a*) Salaries including travelling allowance ..	87,869
(*b*) Contingencies	70,052
Total ..	1,57,921
and the receipts paid into treasury were	51,595

Season

5. The most important feature of the agricultural season in Sind is the inundation. This was worse than that of the previous year (1924-25). The following statement showing the average readings at Bukkur during the most important months of the year under review and those of the previous year will indicate the nature of the inundation :—

Month	Year 1924-25	Year 1925-26
May	5·5	3·3
June	7·8	9·4
July	13·0	12·5
August	14·9	13·3
September	11·1	6·5

6. The river, though it started well, fell suddenly by the end of August and then never recovered. This state of affairs, apart from adversely reacting upon the maturing of the kharif crops, brought about greatly reduced outturns and also affected the quality of the produce. The failure of the river in September also caused a poor rabi season and this was accentuated by the absence of timely rains.

7. A peculiar disease broke out on rice in Larkana district. It has been identified to be Helminthosporium (leaf rust). The damage reported was about 20 per cent. of the total crop specially in Larkana and Kambar talukas.

Frost was practically absent. Fodder was very scarce and sold at famine prices all over Sind except perhaps in the Upper Sind Frontier district. The cotton market opened at Rs. 14 per maund but fell to Rs. 10 at the end of the season thus causing loss to many zamindars who had held up their stocks in the hope of a rise.

Research and Investigation

8. *Cotton Improvement.*—Cotton is one of the staple crops of Sind. The problem in connection with its improvement is two-fold.

Firstly, the improvement of Sind *desi* cotton which alone can grow over the greater part of the cotton tract under the present unstable conditions of water supply ; secondly, the introduction, or production by hybridization, of long-stapled varieties suitable to the Province.

9. With regard to *desi*, this cotton is not considered by the trade to possess staple but it is in high favour because of certain other characters which it possesses in greater degree than do the other cottons of a similar type in India. These are—

(1) roughness,

(2) brightness.

10. Of the large number of strains which the department isolated on the basis of high ginning yield and earliness, some years ago, only the one known as 27 W.N. has withstood the test and it is now being

maintained in a state of purity from year to year. Ordinarily the maintainance of purity is not a difficult problem but in Sind where natural cross-fertilization is so very common, the renewal of a fresh stock of self-fertilized seed every year is a necessity. This is carried out and the seed multiplied through the departmental agency under somewhat elaborate organization, till the fourth generation when seed reaches a figure sufficient to sow about 6 to 8 thousand acres. At this stage the organization passes, subject to the supervision of the department, into the hands of the growers and the leading buyers. The fifth generation, multiplied to at least four times the quantity of the fourth generation, is further issued. Here the Department ceases to follow it further and the seed is distributed by the firms direct.

11. Under the multiplication scheme 49 acres 11 gunthas were grown with 27 W.N. on the Seed Farm, Mirpurkhas, and although the year was one of the worst from irrigation point of view, an average outturn of 7 maunds per acre was obtained. Similarly our Chellaro substation produced 3,903½ maunds of phutties on an area of 393 acres, thus giving an average outturn of about 10 maunds per acre and the total seed production of 2,196 maunds. The ginning percentage as tested on the Farm came to 38·1 which compares favourably with the last year's figure.

The other seed multiplied on the private seed growers holdings under the departmental supervision amounted to 3,114 maunds. All the above quantities were issued to zamindars, *vide* details under "Propaganda and Service."

12. In the matter of long-stapled cottons, we have now 3 Punjab types of American cottons, *viz.*, F-4, 285-F and 289-F. Of these the first two have shown promise and are much in demand. These have the medium staple but have proved to be healthy and prolific, fitting in with the present conditions of water supply and possibly other environmental conditions. The strains Nos. 1 and 2 recently isolated from 285-F (mass-selected) were subjected to tests, for the first time, on a field scale with the ordinary F-4 on an area of about 4 acres and a half, on the Seed Farm. The results are tabulated below :—

Series	Plot	Area	Crop	Date of sowing	Outturn in lbs. per	
					Plot	Acre
		A. g.				
13	1	1 26	Plant No. 2 of 285-F .	3rd June 1925 ..	940	570
13	2	1 20	Plant No. 1 of 285-F .	4th June 1925 ..	1,312	875
12	2	1 20	F-4 ..	14th June 1925 ..	2,078	1,386

Strain No. 1 has shown superiority over strain No. 2 but has proved to be far inferior in outturn to F-4 in spite of the latter having been sown 10 days later.

13. Again in a test carried out between the mass-selected 285-F and F-4 on an area of 5 acres 24 gunthas and 5 acres 38 gunthas each respectively the average outturn per acre of F-4, *viz.*, 452 lbs. has exceeded the average outturn per acre of 285-F by 45 lbs. In view of this consideration and also in view of the fact that F-4 has a higher ginning percentage and is also more popular with the people, it has been decided to concentrate on this type and to maintain it as our standard among the present American cottons in Sind.

14. As promised in the last year's report we have now made a start with our seed production scheme of American types principally the F-4 and although the beginning is inevitably small due to want of early supply of water we expect to be at least partially self-contained in the matter of American seed supply in the following year.

15. Of the still longer stapled exotic cottons, having a staple of over one inch, Pima, Webber-49-4, Durango, Hartsville, Delfas and Cleveland were further tested with 285-F Punjab under well irrigation on the Mirpurkhas Farm. The results confirmed the last year's opinion that the Punjab types apart from giving better germination and better stand give higher outturn. It is therefore a clear indication of the fact that none of these exotic varieties, though sown as early as March, are capable of giving as much outturn as the Punjab types. This explains the necessity for evolving our own strain or strains which should possess all the strong points of F-4 such as prolificness, immunity to red leaf blight, earliness and in addition possessing a staple of one inch or above for the future needs of the country.

Selection work on these cottons is being carried out with a view to getting a pure supply of seed from self-fertilised material under the same organization as has been described for 27 W.N.

Comparing the exotic varieties among themselves it was found that Durango with $1\frac{1}{8}''$ staple and 31 ginning percentage, Hartsville with $1\frac{1}{8}''$ staple and $27\frac{1}{4}$ ginning percentage and D. T. Webber with $1\frac{1}{8}''$ staple and 26 per cent. ginning outturn, grew more healthy and hence these types will form the basis of the future work on stapled cottons at Sakrand.

16. Regarding the two crosses which our Cotton Breeder made in 1924, *viz.*, Sea Island × 285-F and Pima × 285-F there survived only 9 plants in the first cross and one plant in the second cross. Seed from these has been separately collected and sown at Sakrand in the current year.

17. *Wheat Improvement.*—Work on this crop has been in progress for some years and may be classified into the following two groups:—

(*i*) Improvement of Local Sind varieties.

(*ii*) Introduction of varieties of high fame from other parts of India.

The direction which the departmental work took in the improvement of the local wheats was to have a number of strains with superior characters isolated from the best Sind varieties. These in due course were

reduced by process of elimination and the most promising ones that we have now retained are :—

(*a*) C.P.H. 27	.. From the well-known Phundani of North Sind.	These are beardless wheats.
(*b*) A.T. 38	.. From Thori	
(*c*) G.S. 25	.. From Sindhi white ; it is a bearded wheat.	

The first two are successful in North Sind and the last one is popular in East Sind.

18. Of the introduced varieties, which were several in the beginning, only two have been retained and these not only suit the Province well but give considerably higher yield than the local types, besides being of better quality. These are Pusa 12 and Punjab 11. Pusa 12 has now become the standard type of wheat for Upper Sind and Punjab 11 has been found to be the best among awned wheats of Mid and East Sind.

19. In paragraph 16 of the last year's report certain figures of the comparative tests made between Pusa 12 and the selected strains of Thori and Phundani (C.P.H.-47 and A.T. 38), both under irrigation and bosi conditions, were recorded and it was shown that both the selected strains gave a little higher yield than Pusa 12. In order to get further confirmation of these results tests were laid down at the following places :—

Larkana	.. Under irrigation
Sukkur	.. Do.
Jacobabad	.. Bosi.

At Larkana C.P.H. gave an increase of 17 per cent. over Pusa 12, while at Sukkur the increase amounted to 10 per cent.

A.T. 38 gave an increase over Pusa 12 of 10 per cent. at Sukkur and 7·4 per cent. at Larkana.

20. Jacobabad on the other hand records quite the reverse of what has been achieved at Larkana and Sukkur. Here C.P.H. is beaten by Pusa 12 to the extent of 8 per cent. and although the increase cannot, in the terms of probable error, be called decisive, yet it is significant in view of the general impression prevalent in certain quarters that Pusa 12 under Bosi conditions is not equal to local wheats. A further contradiction of this impression, based on actual experimental data, has been recorded under paragraph 24 below.

A.T. 38, however, proved its superiority at Jacobabad by 24 per cent.

21. These results point, for the moment, to our selected strains, particularly A.T. 38, being superior to any wheat we are handling at present, although some more confirmatory tests may be necessary to equalize seasonal and other factors involved in the conduct of delicate experiments.

22. In the comparative tests of bearded wheats of which we have an improved strain (G.S. 25) from Sindhi white and imported Punjab 11, among themselves, together with the recently imported type 8/a which has become so famous in the Punjab, results do not show superiority of any, from the yield point of view. Seeds of all the desirable strains as also the imported varieties of Pusa 12 and Punjab 11 are continued to be maintained and multiplied by the same process as described for cotton.

23. In the biometric study of the various characters of agricultural and economic importance on several types it has been shown that out of our selected strains and imported varieties A.T. 38 has the highest tillering capacity and that Pusa 12 besides being the earliest of the lot has the highest percentage of grain to dry matter.

24. The general impression in certain districts of Upper Sind with regard to our Pusa 12 as a bosi crop is not entirely good although it is acknowledged to be the first class wheat under irrigation. Our results on the Jacobabad Farm which is entirely bosi area did not, however, tell clearly in that direction. To supplement these results a well planned experiment was conducted in the very heart of the district (Sukkur) from which the complaints about Pusa 12 had originated. The experiment was made on a zamindar's holding under exactly the same conditions as prevail in the district and was done in replications so as to minimise soil variations.

25. The following statement summarises the results :—

Area in Sq. Ft.			Variety	Seed rate, lbs.	Date of		Yield in lbs. per acre		Rainfall during season
Fertile	Sterile	Total			Sowing, 1925	Harvesting, 1926	Grain	Straw	
2,979	21	3,000	Pusa 12	11	24thNov.	7th Apr.	1,433	1,241	0·28 on 11th March 1926. Cloudy and rainy weather from 2nd week of March to end of 3rd week.
2,832	168	3,000	Do.	11	Do.	Do.	983	919	
						Total	2,416	2,160	
						Mean	1,208	1,080	
3,000	..	3,000	Phundani local	11	Do.	Do.	1,218	1,160	
2,622	378	3,000	Do.	11	Do.	Do.	996	829	
						Total	2,214	1,989	
						Mean	1,107	994	
			Difference in favour of		Pusa 12		101	86	

I think the above results are sufficiently convincing to go a great way in removing this wrong impression,

Similarly in a bosi test carried out in replications on the Shikarpur sub-station Pusa 12 is shown to have yielded 1 maund 8 seers more than the local Phundani per acre.

26. *Rice Improvement.*—Work on rice is conducted on the Larkana Farm and is in the form of improving by selection the marginally noted representative varieties and testing a number of foreign varieties with a view to introducing if possible the most promising ones; as also to make crosses between the best local and foreign types to produce hybrids which should have all the market qualities, high prolificness, and earliness.

Kanagani.
Jajai Sugdasi.
Prong Sugdasi.

27. The five selected strains from each of the above three important varieties of Larkana rice retained upto 1924-25 and further reduced to three of Kangani and two of each of Jajai and Prong were again compared with the ordinary local seed and also among themselves under the usual method of replication. The Kangani strains which are numbered as 27, 43 and 25 gave the following increased outturn over the local seed :—

Kangani 27	.. 19·07 per cent.
Kangani 43	.. 28·16 per cent.
Kangani 25	.. 31·68 per cent.

In the matter of earliness none had superiority over the local. In the Jajai variety strains Nos. 43 and 77 had increased outturns of 27·43 per cent. and 13·97 per cent. each respectively over the local seeds, but the former beat the latter by an increased yield of 17·39 when compared between themselves. None, however, showed any earliness in maturity over the local seeds.

28. Of the selected strains of Prong, *viz.*, Nos. 36 and 51, the former yielded 32·19 per cent. and the latter 24·86 per cent. more than the local seed, but none showed any appreciable increase or decrease in yield over each other when compared between themselves, nor was any earlier than the other.

29. From the above account it will be seen that our selected strains have stood the tests of some years very admirably and we have now arrived at a stage when all possible efforts are needed to multiply their seeds for distribution. The demand for the seeds has grown very keen as a result of the trial of our strains by a few intelligent zamindars in the neighbourhood of the Farm and although some of our seeds failed in common with the local crops on account of the deficiency of water, yet there were one or two striking examples of our strains giving as much as 50 per cent. increase over the local seeds.

30. Our seed multiplication organization is, however, developing steadily under the same arrangement of renewal of a fresh basis of self-fertilized seed every year as described for the crops in the foregoing paragraphs and it is hoped that with the co-operation of zamindars and organized societies we shall soon be in a position to cover a large area with our improved seeds.

The details of seeds of the selected strains multiplied and issued will be found under " Propaganda and Service."

31. In the matter of comparative tests of foreign varieties with Sind rices, Indrasal and Dudsar from Assam were found to be late ripeners by 30 to 40 days and although Dudsar gave an increased outturn of 59·46 per cent. over our Jajai 77, yet it is not suited to the present irrigation conditions. Dadkani (Bengal) compared with Jajai 77 gave 30·89 per cent. more yield as against 9·7 given last year.

32. In earliness Jajai 77 was about nine days in advance of Dadkani although this factor was almost equal last year.

33. The three strains, *viz.*, Columba 153, 184 and 241, received from Karjat Farm were put in comparative tests with Kangani 27 along with Columba 79. The results have been recorded with a view to get confirmation of these next year.

34. Other varieties studied were the Japan rices, the C. P. types, the Deccan types, the Assam types and Ratnagiri types. Some promising types out of this lot have been selected for further test. Our further work of testing of these as well as others with our selected strains of Kangani, Jajai and Prong will be based on the following characters :—

1. For high tillering ;
2. Weight of grain ;
3. For earliness ;
4. For number of grains per head ;
5. For fineness of grain.

35. In addition to the work detailed above biometric study aimed at measuring variations and recording average measurements of characters which have a bearing on capacity to yield and market value was made on the selected strain and the results recorded.

36. The study of natural course of fertilization as noticed in the last year's report was continued as also the study of sterility on rice which is so common and as high an average as 34 per cent. of the total florets formed on an ear, but I think this last matter requires to be systematically studied by a specialist.

37. Other work on rice deals with the problem of—

(*a*) seed rate per acre ;
(*b*) date of transplanting ;
(*c*) rab material ;
(*d*) dry ploughing *versus* puddling of rice land.

Extended work on these problems has now assumed a definite shape and it has been shown that 20 seers is the best seed rate as against 52 seers used by cultivators and that seedlings transplanted in June give an increased yield of 50 per cent. over the crops transplanted after first week of July. In the matter of rab, the substitutes for the usual cow dung, *viz.*, (*a*) *drub* grass, (*b*) rice husk, (*c*) sulphate of ammonia, (*d*) castor cake either in combination of two or individually ; the sulphate of ammonia with *drub* grass as burning material has been found to be the cheapest

and most effective. This result is of special value when we consider the cost and trouble involved in procuring the cow dung or the rice husk, the latter now being used as fuel for the " Josh " industry.

All these results are being put into a consolidated form for issue as leaflets.

38. The current year's programme includes among other things the crossing of some of our selected strains with other varieties of desirable characters.

39. *Jowar Improvement.*—Jowar is one of the most important crops in Sind and the height attained by it is most impressing. The varieties found are many but they merge into one another and a clean-cut classification has therefore been found to be very difficult. As the result of an attempt towards the classification of the varieties, began in 1921 we succeeded in obtaining 56 types which were grown at the Larkana Farm and notes taken of their characters. Of these 56 varieties 12 have now been separated as the best and these will form the basis of our future work of selection to get pure material of each kind. The characters for study will be :—

(*a*) earliness,
(*b*) yield per ear head,
(*c*) height of plant,
(*d*) sterility,
(*e*) character of grain.

40. Apart from this work the following varieties have been multiplied for distribution :—

(1) Alakh,
(2) Bagdar,
(3) Achro Kodri,
(4) Janapur Garhi,
(5) Sathri.

The seeds of these have been given out. The details will be found under " Propaganda and Service."

41. *Berseem or Egyptian Clover.*—In para. 27 of the last year's report a few observations were made with regard to the value of berseem as a fodder crop. As usual the crop was grown on the Larkana and Sukkur Farms where facilities for rabi irrigation exist. In fact the entire buffalo herd at Sukkur depended for its winter fodder supply on this valuable fodder. The average outturn of green fodder on this Farm per acre amounted to 438 Bengal Maunds and the highest to 577 Maunds. The figures of seed outturn are not available because the crop has not yet been fully threshed.

42. *Fruit.*—The work on fruit is being continued on the Mirpurkhas Farm. The adverse irrigational conditions here have not allowed the economic aspect of the problem being fully worked out but with the reorganization scheme which provides for two big wells and extension of the area from 9 to 21 acres, it will be possible to study various phases of the fruit industry.

The present work consists of the growing and comparison of several varieties of vines, citrus family, mangoes and peaches. Results show that from the point of prolificness and flavour Nagpur orange is the best and that Sylhet commonly known as "Musumbi" is the next best. Unfortunately the orange trees did not bear owing to deficiency of water but now that the well has been improved, the trees have started bearing and the fruit will be ready before Christmas time (1926).

43. Varieties of American oranges called "Royal George Navel", "American Navel" and "Washington" though flowering copiously have been found to set no fruit and this experience seems to be in agreement with the results obtained in the Presidency with the "Royal George Navel." Of the Pomelo variety the "Marsh" imported from Saharanpur does not compare favourably with the common red fleshed variety both in size and in flavour. "Bedana" and the large white fleshed have not yet fruited. Study of a large collection of limes with the object of finding out the best stock for budding and grafting oranges upon, show that Karna, Jamburi, Sharbati and Katharia are the most suitable and that, in the matter of fruit, "Kagzi" round and long are the most prolific and remain in bearing practically all the year round.

44. Of the varieties of vines "Motia" (white) has proved superior in quality to Gulabi (rose) but is a shy yielder.

45. Varieties of Bombay mangoes imported some years ago continue to give satisfaction. The Alphonso and Cluster have proved to be the best of the lot in flavour. The "Khasa" from United Provinces has also given satisfaction.

46. In the year under report the canal again worked badly and hence trees did not yield well. The total sale proceeds of fruit amounted to Rs. 324-14-8 only.

The number of cuttings and young plants supplied to the public amounted to 524 plants and 277 cuttings worth Rs. 281-12-8.

Miscellaneous

47. *Implements and Machinery.*—In the matter of invention, introduction and study of the various types of implements of economic value the Department has now made a very considerable advance. The implements successfully introduced are:—

(*a*) The Sircar plough.
(*b*) The Meston plough.
(*c*) The Chattanooga plough.
(*d*) The Sardar plough.
(*e*) The Cambridge Roller.
(*f*) The Disc harrow.
(*g*) The Hand Archimedean Screw.
(*h*) The Norag Threshing Machine.
(*i*) The Scraper.

These are all recognised to be useful and superior to the cultivator's original stock of a few crude and ineffective implements of husbandry.

Local shops can now be seen scattered all over the advanced tracts, manufacturing the Sircar and the Meston ploughs and the hand Archimedean screw in hundreds and selling them.

48. Among the new introduction in the year under review are :—

(1) The Orient plough.

(2) The McRown plough.

The former is the imitation of the original type of Messrs. Ransoms, Sims and Jeffries and has been produced by Mr. Schutte at a cost of Rs. 20 as against Rs. 32 of the original type. It has been found satisfactory on trial and hence will be included in our list of standard types. The McRown plough was found unsatisfactory.

49. Among the other implements tested were the Hoosier drill, the three-tined rabi drill of the Punjab, the De Pole threshing machine, the Norwegian harrow and the Jowar winnower by Messrs. Penny and Porter of Lincoln. The Hoosier drill has now been continuously worked for five years and has gone on working without any repairs or the replacement of any essential parts. It can sow six acres in a day of eight hours with a pair of bullocks with only a single shift of bullocks, at a cost of annas eight per acre as against Rs. 1-10-0 by the local method of sowing with a one-coultered drill.

The three-tined rabi drill manufactured in the Punjab and imported this year was tried in comparison with the local and the Hoosier drills at the Jacobabad Farm.

The results are summarised below :—

Name of drill	Distance between the rows	Distance travelled by bullocks in sowing 1 acre	Power required	Area sown	Cost of sowing
				A. g.	Rs. a. p.
Local 1-coultered	1 ft.	7·25 miles	1 pair	1 0	1 15 0
Punjab 3-coultered ..	9 inch	3·275 „	1 „	2 0	1 4 0
Hoosier six Disc drill ..	1 ft.	1·25 „	2 „	6 0	0 10 4

In view of the initial cost of the Punjab drill being comparatively small, *viz.*, Rs. 15 only and the efficiency greater as compared with the local drill, I foresee an excellent future for it.

50. The trial of " De Pole " threshing machine showed that it left a good deal of wheat straw unbruised and hence an attachment of Bhusa bruiser is of a paramount necessity. Besides, the breakage of grain during the operation was rather large, inspite of the necessary adjustment having been made recently in the machine. The matter is under further investigation.

51. The Norwegian harrow proved very effective at Mirpurkhas Farm in breaking up the soil crust.

52. The jowar winnower on the other hand failed to give satisfaction and hence has been sent to the Agricultural Engineer for examination.

53. In the matter of mechanical cultivation Cletrac tractor continued giving satisfaction on the Jacobabad Farm. It worked for 163 days on various operations, *viz.*, ploughing, reaping, threshing, chaffing and pumping.

The year's expenditure on ploughing per acre was as under :—

	Rs.	a.	p.
Running expenditure	3	7	7
Overhead charges	2	6	8
Total ..	5	14	3

These results are in conformity with those recorded in the last year's report.

54. *Ginning cotton.*—The two small ginning plants (the Saw and Roller gins) on the Seed Farm, Mirpurkhas, were worked during the year for ginning the whole cotton produce of the Seed and the Experimental Farms.

In this connection a point has come to the forefront as to why *desi* cotton should not be ginned in a Saw gin which, according to the manufacturers' opinion, is capable of ginning four times as much quantity as a roller gin can, with again a further advantage that the stuff turned out by the saw gin is absolutely clean. Messrs. Ralli Brothers who were consulted do not favour this idea because they think that the fibre of *desi* cotton gets injured in the saw gin. In fact they refused to buy the *desi* stuff ginned in a saw gin by the Department a few years ago, on this score. The manufacturers, however, assert that this defect can be remedied by increasing the speed of the gin.

This matter will form a subject of investigation by me in the current year.

55. *The buffalo herd.*—The buffalo herd established with the object of improving the breed of local buffaloes in Upper Sind where they exist in enormous number continues to fulfil its object satisfactorily. The possibilities of berseem as green fodder crop to maintain this herd have also been studied and it has been shown that an area of 30 acres cultivated intensively with berseem grown in rotation with jowar every year not only maintains over 30 adult animals even on low concentrate feed but keeps up its fertility under the influence of berseem.

56. The strength of the herd on 1st April 1925 was as follows :—

Adult buffaloes	10
Calves	32
Heifers	7
Bull	1
Total ..	50

Births during the year were 10 and deaths 3.

Of this stock 32 animals including adults, heifers and calves were disposed of as undesirables; adults on the basis of performance and old age and the others on the basis of constitutional vigour and other points.

The total number of animals remained in milk in the year under review was 19. The best cow gave 4,697 lbs. in 300 days as against 4,659 lbs. of last year.

57. We issued two premium bulls during the year to a zamindar at Larkana and two more bulls have been put to yoke to investigate their usefulness for draught purposes.

58. *Rat Pest Investigation.*—In the last year's report the results of investigation of the rat pest on rice together with various methods of control tried, were discussed. Extensive trials given to poisoning and fumigating methods and some new poisons such as sulphate and hydrocyanic acids on a block of field, point to fumigation methods to be the best remedy for rat destruction. The zamindars acknowledged this after digging out a large number of burrows and finding dead rats inside. The only objection advanced was that this method cost more than digging out the rats by hand. If, however, the wholesale extermination in definite areas is the object, the two methods cannot compete and hence a large scale demonstration is being organized in the current year at two centres on an area of $2\frac{1}{2}$ square miles of rice land at each place. The object is to educate the people in the method of rat destruction by fumigation.

It is hoped that the tracts affected will take advantage of this to carry out the methods themselves in the succeeding years when necessary.

59. *Aricultural Bias Schools.*—The new types of primary schools with an agricultural bias, first introduced in Sind in 1924 have increased in number during the year under report. There are now 6 schools one at each of the 6 districts of Sind. In Thar Parkar which is the 7th district the classes are in the course of formation.

The agricultural teachers for these schools after taking a short course at Lyallpur are given technical training on our farms and my staff and I visit these schools and the small farms attached to them, from time to time, for the necessary advice. At the request of the authorities I shall have from the current year (1926) my assistants stationed at the respective districts, put on the list of examiners to examine the boys in agriculture.

60. Of the other manifold activities the organization of Taluka Development Associations and the extension of propaganda over several new Talukas have claimed the attention of the Department.

61. It was the proud privilege of the Department to receive the following distinguished visitors at the Departmental farms and to discuss matter of local agricultural importance with them :—

1. His Excellency the Right Honourable Sir Leslie Orme Wilson, P.C., G.C.I.E., C.M.G., D.S.O.
2. The Honourable Mr. A. M. K. Dehlavi, Minister.
3. The Commissioner in Sind.
4. The Collector.
5. J. C. Ker, Esquire, C.I.E., I.C.S.

62. *Chellaro plot.*—The Chellaro plot started for the multiplication of seed had 393 acres under 27 W.N. in the year under report. Out of the total production of 3,903 maunds of seed-cotton about 293 maunds representing last pickings were rejected. The balance gave 2,205 maunds of seed for distribution.

The sub-station showed a net profit of Rs. 16,027-12-9.

Propaganda and Service rendered to the Public

63. Government issued instructions in the year 1921-22 for the carrying out of an intensive scheme of propaganda in certain selected areas. The unit of the area has been fixed as a taluka. In the year following, a further development in this organization took place. This consisted in combining co-operative and agricultural propaganda under the control of one Officer. Khan Bahadur Azimkhan accordingly took charge of the combined work in certain talukas towards the end of February 1923. The talukas assigned to him then with further additions since made are noted in the margin. Propaganda work whether extensive or intensive in the rest of the province is dealt with directly by the Agricultural Department.

1. Hyderabad.
2. Hala.
3. Shahadpur.
4. Tando Allahyar.
5. Sukkur.
6. Ghotki.
7. Kambar.
8. Larkana.
9. Dero Muhbat.
10. Shikarpur.

Intensive work was first confined to three talukas but in subsequent years some more talukas have been added. All these are noted in the margin.

1. Mirpurkhas.
2. Jamesabad.
3. Digri.
4. Sinjhoro.
5. Nawabshah.
6. Guni.
7. Badin.
8. Tando Bago.
9. Jacobabad.

The chief material of propaganda are seeds, implements and improved methods of cultivation.

64. The seeds handled are :—

(*a*) The improved strain of *desi* cotton named 27 W.N.
(*b*) American cotton,
(*c*) Wheat,
(*d*) Rice,
(*e*) Jowar,

the merits of these have been described above against each.

65. The total quantity of 27 W.N. seed produced and distributed in the year under review by the Department was 1,363¼ Bengal Maunds and that distributed in the current year amounts to 5,394 Bengal Maunds. Of this quantity 2,196 Maunds are the produce of our Chellaro plot and the balance, *viz.*, 3,198 Maunds, is collected from the seed growers. This quantity though 3 times greater than the quantity distributed last year was yet insufficient to meet the demand in full. Our seed organization is however steadily developing and we hope to be in a position to meet the increasing demand to the highest possible limit (*vide* paragraph 9 above).

66. *American cotton.*—The varieties of this cotton under cultivation are the Punjab F-4 and the Punjab 285-F. The merits of each variety

have been discussed in paragraph 11 above. The quantity of seed supplied during the year was as under :—

F-4	2,497	Maunds.
285 F	3,306	,,
Total ..	5,803	,,

This quantity is sufficient to sow about 18,000 acres but owing to very unsatisfactory condition of water-supply, more than one-third of the seed could not be sown. Thus the total area under this cotton is returned as close upon eleven thousand acres only.

The quantity of seed distributed in the current year is as follows :—

F-4	1,814	Maunds.
285 F	743	,,
Total ..	2,557	,,

The above American seed represents in part the quantities supplied by some of the leading firms direct to cultivators. The seed so distributed was from the crop originally raised from the departmental seed and sold to the firms under the multiplication scheme organized by the Department.

67. *Wheat.*—The kinds of wheat seed issued, together with quantities of each were as under :—

Pusa 12	34,447	lbs.	from Jacobabad.
Pusa 12	1,040	”	from Larkana.
A.T. 38	1,764	”	from Jacobabad and Larkana.
C.P.H. 47	1,445	”	from Jacobabad.
G.S. 25	1,238	”	from Jacobabad.

The bulk of Pusa 12 as usual remained confined to North Sind where the conditions for its success are more favourable. The area under it is estimated to have reached over 12,000 acres.

68. Punjab 11 and G.S. which are wheats of East Sind, had their cultivation largely suspended due to the failure of water in the Rabi but with the improvement of water-supply the cultivation of these wheats will quickly revive.

69. Rice seeds of the strains of 3 varieties, *viz.*, Jajai, Prong and Kangni were issued for cultivation in Larkana district. The total quantity amounted to 103 maunds. The results have been discussed in paragraph 28 above. The quantity distributed in the current season amounts to over two hundred Bengal maunds.

70. *Jowar.*—Ten maunds seed of the 5 different varieties purified on the farm have been given out in the current season for cultivation and further multiplication.

71. *Implements and machinery.*—The two types of improved light ploughs, *viz.*, the Sircar and the Meston are now entirely manufactured by the local “ mistries ” in various centres and their annual turn over is very

considerable. A chart showing the extent of country covered by the improved plough accompanying the last year's report, is a lucid indication of its spread.

Of the heavier types of ploughs and other machinery issued by the Department, their names are noted in the margin. In this matter large sales can not be expected every year as their life is comparatively long. In view of this consideration and also in view of the fact that the general condition of cattle is too poor to work these heavy implements efficiently, the amount of their sale is small though steady.

1. Monsoon iron plough.
2. Chattnooga plough.
3. Iron Lift.
4. Chaff Cutter.
5. Cambridge roller.
6. Norag threshing machine.
7. Hand Archimedian screw.
8. Iron scrapers.
9. Steel plough shares.

72. In the matter of improved methods of cultivation we had our usual demonstrations of sowing cotton in lines as against broad-casting the seed. In a year of late and short inundation which has now become the feature of irrigation, rapidity in sowing irrespective of any consideration for the quality of work, becomes the rule. Hence the area operated upon, *viz.*, 145 acres was far too below the original programme. The method is however appreciated by the public inasmuch as fields can be seen cultivated with this improved method, independently, in areas where irrigation conditions admitted this to be done.

73. A novel feature of the year's progress in the demonstration of the " bosi " method of sowing wheat on the Jamrao was that scattered areas were cultivated by zamindars during the year of practically the complete failure of rabi water after sowing of these wheats. Notwithstanding, the crops on these areas thrived, because the necessary moisture was conserved by an elaborate method of tillage with the heavy iron plough and gave outturns of 6 maunds or over per acre on several plots.

74. The small sub-station at Jamesabad started some years ago with the object of educating zamindars in the new and improved methods of cultivation was again successfully run. It gave a net profit of Rs. 245 which is significant looking to the agricultural season being one of the worst on record.

75. The village to village demonstrations with improved implements and seeds is the usual routine now and was carried out both by the Departmental staff and the Taluka Development agencies in 50 villages.

76. In addition to the above, two big shows, one at Jacobabad (Upper Sind Frontier) and the other at Digri (Thar Parkar District) were organised and successfully run. One of the features of these shows was the demonstration of tractors and as a result one of the leading zamindars of Jacobabad Taluka has just purchased a case tractor for use on his estate.

77. Among other services rendered were the help given by our Mechanical assistant to the public, in connection with the pumping and

boring operations. The Taluka Development Associations of which 3 are directly managed by the Department and were started last year continued to do satisfactory work. They had their usual meetings in the course of the year and the interest evinced was very praiseworthy. Their supervisors and kamgars had a large share in the usual village to village demonstrations of improved implements and seeds. The seed distributed in their talukas was largely handled by them under the guidance of the department. The public subscriptions with which these associations started were reported in the last year's report.

Two more associations are in the course of formation.

78. The six new talukas taken up for the intensive propaganda in the year under review necessitated the redistribution of charges of the propaganda staff. Under this arrangement the three talukas of Tando division of Hyderabad district form a separate charge under an Inspector with Tando Mahomed Khan as headquarters.

The Divisional Superintendent gets two more talukas, *viz.*, Sinjhoro and Nawabshah added to his charge of Mirpurkhas sub-division.

Jacobabad (U. S. Fr.) is maintained as a separate unit under the management of the Superintendent, Wheat Farm, Jacobabad.

The work in these new talukas has been begun in right earnest.

GUL MUHAMMAD ABDUR REHMAN,
Deputy Director of Agriculture, Sind.

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APPENDIX I

Work done under the Professor of Agriculture during the year 1925-26

Charge.—I continued to be in charge of the office of the Professor of Agriculture throughout the year.

Nature of Work.—The principal work under me consists of the teaching of Agriculture and Dairying. For teaching the practical side of the subjects a large farm and a dairy have to be run involving the administration of two large institutions.

The College Farm and the Dairy further serve as centres for demonstrating to a large number of visitors improved methods of crop production, the use of improved implements, the proper methods of rearing and handling live stock, etc.

The Farm is also looked upon as a Central Bureau by Agriculturists in the matter of supply of improved implements and seed and also for advice on practical problems of Agriculture.

Staff.—Mr. M. M. Desai, B.Ag., acted as Manager of the Dairy and Assistant Professor of Dairying upto 4th January 1926 when Mr. Baluch, the permanent incumbent, resumed his charge. With this change the staff remains the same.

Owing to great increase in teaching work due to revision of the College course in Agriculture, one post of Lecturer in Agriculture was sanctioned. This will enable us to just carry on our teaching work with the bare minimum of staff.

Research and Investigations.—Cultural experiments on turmeric crop as mentioned in last year's Report have been continued during the year and the broad-ridge method of planting turmeric has given as last year a very high yield of 33,552 lbs. of green rhizomes against 26,388 on ridge and furrow method. Ginger, another promising crop, in this part of India gave 11,402 lbs. of green rhizomes on the broad-ridge method. This crop during previous years was never found successful when grown in beds.

Economics of Tillage and implements.—The investigations on economics of tillage and implements as reported last year were continued during the year and though we have learnt something, no definite conclusions could be arrived at on account of unfavourable season which affected the growth of crops and also because the subject being very complex will need further spade-work before we get at the real problem.

Besides this we have a number of problems on crop production under investigation by various members of my staff.

The Agricultural College Farm

This is first and foremost an institution for teaching practical agriculture to the students of the College. The total area is 275 acres of which about 125 acres are cultivable. From this about 12 acres are set aside for the use of various expert officers at the college and the rest utilised for

teaching purposes and for growing fodder crops for the use of a large number of farm bullocks maintained for teaching.

Season and its effect on crops.—On the whole the season was a very poor one this year as the rainfall was both erratic and unsatisfactory, total rainfall of the year being 14·11″ against an average of 27·11″.

Kharif crops were sown about the middle of July. These crops progressed pretty well in the seedling stage but subsequently for want of rains they showed from about the 2nd week of August signs of losing their vigour as the first effect of drought and the crops, though they temporarily revived to a slight extent from the few showers during the third week in August, could not resist drought and subsequently withered more and more as the season advanced and they all practically dried as the result of both drought and scorching heat in the month of September which was relatively more in this year.

The heavy rains amounting to 3·20″ on the 27th and 29th of September had no effect as all the Kharif crops, except a few that were irrigated, had almost died by that time. To save some of the important Kharif crops like fodder jowar, groundnuts, etc., they were irrigated once or twice according to the supply of irrigation available and such crops being further benefited by the rains that we had in the last week of September yielded well.

Rabi crops such as wheat, *shalu* jowar, gram, linseed, etc., all failed for lack of moisture in the soil.

Irrigated crops on the whole were fairly satisfactory except the cabbage crop which suffered miserably since the winter months were not sufficiently cold, the average minimum temperature in November was 61·3° as against 51·6° in the same month, previous year.

Insect pests and diseases.—Besides the unfavourable rainfall the various crops were attacked by several insect pests and diseases, the prominent ones being as under :—

Aphis on *Mogri*, shoot borer on cauliflower and leaf curl on tomato destroyed the crops almost completely,

The attack of mites and thrips on chillies, of jassides on brinjals and thrips on onions was rather severe and materially affected the yield.

Some noteworthy features of this year's cropping

	Crop	Outturn per acre in lbs.	Net profit per acre
			Rs. a. p.
1.	Nilwa dry fodder irrigated once ..	15,920	Consumed on farm.
2.	Onions	23,472 soon after harvest.	79 8 0
3.	Brinjals	15,572	224 10 6
4.	Suran	50 367	864 6 0

	Crop	Outturn per acre in lbs.	Net profit per acre
			Rs. a. p.
5.	Ginger	11,402	444 7 0
6.	Tondli (Cephalandra indica) ..	9,690	410 5 0
7.	Gowar (vegetable)	15,352	358 4 0
8.	Lucerne (Annual average of 18 months)	48,000	Consumed on farm.
9.	Turmeric (Broad-ridge method) ..	33,552	101 0 0
10.	Turmeric (Ridge method) ..	26,380	31 0 0

Sale and repairs of implements and distribution of seeds to the public

A large number of improved implements including ploughs and their spare parts, draft-chains, iron-mhots and tooth cultivators were sold to the public of the value of Rs. 3,799.

The College Farm also supplied to the public large quantities of seeds of early groundnuts, san hemp, fodder jowar, onion, lucerne, English vegetables and suran and turmeric sets either from the farm-grown stock of seeds, or through reliable dealers and agencies.

The Agricultural College Dairy, Kirkee

Purpose.—(*a*) To provide facilities for practical training (both general and specialised) in animal husbandry and dairy farming to students at the Agricultural College and outsiders.

(*b*) To demonstrate the possibilities of modern dairying as a commercial business under city suburb conditions.

(*c*) To breed and manage a pedigree herd of Sindhi cows and Surti buffaloes for high milk production under Deccan conditions.

The following is the statement showing the strength of the herd on 31st March 1926 :—

Cows	34
Cow heifers	36
Cowbull calves	17
Cowbulls breeding	4
Buffaloes	39
Buffalo heifers	46
Buffalo bullcalves	11
Buffalo bulls breeding	4
Bullocks	34
Horses	2
Total ..	227

as against 244 of the last year.

The herd consisted mostly of Sindhi cows, and Surti buffaloes.

During the year one good cow was sold by private sale for Rs. 400 which seems high but is worth paying if a reliable animal of good milking

capacity is to be purchased. The success of breeding good cattle depends on a genuine appreciation of good cattle by the public.

Statement showing milk yield results of the herd

Year	Average number of adult animals	Average yield of the herd	Analysis of column 2		Average yield of cows	Average yield of buffaloes
			Cows	Buffaloes		
1924-25 ..	91·2	2,671·5	37·9	53·3	2,970·0	2,493·0
1925-26 ..	77·83	3,338·5	34·25	43·58	2,892·68	3,687·0

Milk production

Year	Average number of adult animals	Average number of animals milked	Total milk production in lbs.	Average milk yield per head per year	Cost of production of 100 lbs. of milk	Total milk fed to calves	Total milk sold	Value realised per 100 lbs.
					In Rs.			
1924-25 ..	91·2	63·3	243,643	2,671·5	(16·9) 17·3	20,667	222,976	18·00
1925-26 ..	77·83	62·43	259,842	3,338·5	(19·4)* 17·7	22,538·5	237,303·5	18·06

*Figures in brackets show the cost of 100 lbs. of milk available for sale after feeding calves.

The increase of 50 per cent. in the average yield of the herd of buffaloes is due more to greater percentage of buffaloes calving during the year rather than to the improvement in the producing capacity of the herd.

Cost of production during last year and the year under report is almost the same.

Poultry Industry

During the year a central poultry-breeding farm has been opened on the College Dairy, Kirkee.

Object.—(*a*) To keep record of production by trap-nesting of each bird and select and breed a strain for egg production.

(*b*) To supply at reasonable price the eggs for hatching or chicks and breeding cocks from the selected birds.

(*c*) Probably it may be made available in future for giving practical training in Poultry Farming.

The Poultry farm is working with two breeds, *viz.*, the white Leghorn and Australorp (Black Orpington of Australia).

Remarks.—I am glad to record that all the Members on the Staff of my Section did their work very satisfactorily inspite of great pressure of work and heavy calls on their time.

B. S. PATEL,
Professor of Agriculture.

College of Agriculture, Poona,
August 11th, 1926.

APPENDIX J

Report of the work of the Agricultural Chemist to Government of Bombay, Poona, from 1st July 1925 to 30th June 1926

1. The work under the Agricultural Chemist may conveniently be divided into the following sections for report. They are:—

(1) Analytical work done for the public and for other sections of the Agricultural Department and for other Government Departments.

(2) Investigation Work.

(3) Teaching at the Poona Agricultural College.

(4) General supervision of the manure-mixing Laboratory attached to the Union Agency.

(5) Water-finder work.

It may be stated here, without fear of contradiction, that the work under each of these (except No. 4) has grown so much that each in itself can form a small department.

Analytical Work

2. The number of samples received continues to be high. In the year under report 1,423 samples were received. This number exceeds that for the previous year by nearly 200. These do not include samples analysed in connection with the investigation work carried on in the Chemical Laboratory. The classification of the samples shows that there were 308 soils, 267 manures, 345 waters, 119 feeding stuffs, 247 plants and their parts, 36 oils and oil-seeds, 20 milk and dairy products, 20 fruits and the remaining miscellaneous.

3. The samples from Government Department numbered 979. Many of these were analysed in connection with the various problems that were under investigation in the various sections of the Agricultural Department.

4. A large number of soils were analysed for the Professor of Agriculture in connection with his study of the "Economics of tillage and implements" and for the Cotton Physologist at Surat. Soils from coconut plantation affected with "Band" disease and soils from sewage-treated lands were done for other Officers. Samples of manures consisted of the usual manures and also those under investigation including artificial farm yard manures. A study of the total manurial constituents in crops has been taken up on the College Farm and some crops are being analysed to obtain data in connection with that problem. It was suspected that the sugar-cane juice in the old areas on the Mutha and Nira Canals was richer in sugar contents than the juice in the comparatively new areas of the Pravara and the Godavari Canals. A large number of samples were tested which showed that what was suspected was right. In connection with the study of the stem-borer of Jowar many samples were analysed for their sugar contents.

5. As in previous years a large number of samples came from actual cultivators and from men engaged in industries depending on agriculture. The actual number for the year under report was 444. This indicates that the agricultural public are making use of the facilities offered by way of analysing their samples, and Chemical Laboratory continues to be as popular as ever. Most of the public samples consisted of manures, waters and soils.

Investigation Work

6. Investigation of small problems referred to the Agricultural Chemist are generally included under analytical work and in this report also they have been so included under that heading. Mention of other problems may, however, be made under the heading of investigation work.

7. The first part of the investigation of the recuperation of nitrogen in the Deccan soils was published as a memoir of the Imperial Agricultural Department, Pusa. Further work on the problem is continued especially with regard to the effect of different salts in small quantities and of different nitrogenous manures.

8. The work in connection with the manuring of rice was continued in co-operation with the Rice Experimental Station at Karjat. The work has not yet advanced to the stage of publication.

9. An experiment was tried to improve the condition of the orange plants suffering from the " die-back " disease. This diseased condition is obtained in sticky clayey soils. The plants experimented upon numbered about 75. Trenches were dug on one, two or three sides of plants. All of these plants showed a distinct improvement, proportional to the number of trenches, in their health and bearing capacity. More experiments have been started for confirmation.

10. Preparation of vinegar from toddy has recently been taken up. We have evolved a method to shorten the period of preparation. The method is now being tried on a large scale.

11. A good deal of work was done on buffalo casein during the period under report. This was taken up to find out the difference in the composition of the cow and buffalo caseins with regard to the various amino-acids forming them and also with regard to their digestibility. Some more work remains yet to be done before the material can be sent for publication.

12. A large number of samples of milk supplied to Poona City from various sources were tested with regard to their cleanliness and keeping power. The results will be soon published.

Teaching

13. I was responsible for the teaching of Geology and Chemistry to all the classes at the Poona Agricultural College. On account of the increased number of students the teaching work has become very heavy and my teaching staff finds it difficult to deal with so many students. I am glad to say, however, that everyone of them utilises the time between College terms to carry on some kind of investigation. They are anxious to do research work but they do not get any time to themselves.

14. In addition to the general classes there are always one or two post-graduate students. These are trained either as analysts or as investigators. Last year one of these students obtained the M.Sc. degree of the Bombay University on the work done by him under me.

Manure-mixing factory

15. In accordance with Government Resolution, Revenue Department, No. 353-A, dated 17th November 1925, Mr. B. H. Patil's services were lent to the Union Agency to work in their laboratory till the end of March 1926. A new arrangement has now been made in which the uniformity of the manure mixtures will be tested from time to time by deputing some one of my assistants to take samples once in a month or so.

Water-finder work

16. In the year previous to the one under report there was only one assistant for water-finder work but on account of the increasing demand for such work two more assistants with two new machines were sanctioned and yet the whole demand could not be satisfied. One of the assistants was placed at the disposal of Major Pogson to test the places located by him. Seventy-two such places were tested. The interpretation of the readings was given by me. The other two assistants tested lands of those who asked for advice with regard to underground water. The machines were used on 491 spots during the year under report. My experience enables me to interpret the readings of the machines accurately. Where wells have been dug on the places predicted by me water has been found. The machine has proved to be very useful. It must be stated, however, that it will be valuable only in the hands of an experienced man having knowledge of the geology of the locality.

17. Work has increased under every head of the chemical branch and clerical work also has increased proportionately especially on account of the increased water-finder work. I am glad to say that everyone of my staff has worked satisfactorily under the strain of heavy work. Mr. J. A. Daji who was an experienced and careful research worker has been transferred to Sind.

D. L. SAHASRABUDDHE,
Acting Agricultural Chemist to Government
of Bombay, Poona.

APPENDIX K

Work done under the Economic Botanist to the Government of Bombay, Poona, for the year 1925-26

Professor G. B. Patwardhan held charge of the post of the Economic Botanist to Government of Bombay, Poona, throughout the year with the exception of the period between February 10th, 1926, and April 6th, 1926, at the beginning of which Dr. W. Burns assumed charge of his permanent post of Economic Botanist and at the end of which he was transferred to the post of Joint Director of Agriculture, Bombay Presidency, Poona. Mr. L. B. Kulkarni acted as Assistant Professor of Botany. Mr. R. B. Deshpande is acting as Assistant Economic Botanist in place of Mr. Kulkarni and Mr. S. R. Godbole has been finally absorbed into the Economic Botanist's establishment.

The Economic Botanist also held charge of the current duties of the Plant Pathologist to Government of Bombay, Poona, as last year.

Education

Teaching of Botany to the College classes was conducted as usual—The Economic Botanist, the Assistant Professor of Botany the Demonstrator and one Assistant sharing the work.

Ten students specialised in Advanced Botany and Horticulture in the final year, of which one belonged to the Diploma Course and the rest to the Degree course of the latter eight passed the B.Ag. examination.

Students of Agricultural Schools, of Training Colleges for Men and for Women in Poona, took advantage of the Botany Branch. The staff was also helpful to the Nature Study Club of Poona during its rambles, lectures and demonstrations.

Lectures on grass improvement were given at the Alandi show in July 1925 and exhibits were also supplied for the show.

Seed Testing

The number of seeds tested was 628 a number more than treble that of last year. Of these 333 were cereal and pulse crops, 87 of fodder, 183 of grasses and 25 of weeds.

Longevity tests.—The interim results of these trials are that the percentage of reduction in germination at the end of four years was Bajri 19, Maize 11, Gingelly 12, Groundnut 59, Safflowers 4, Cotton 13 and Linseed 3. There were increases in Mug (Phaseolus mungo) Udid (Phadeolus radiatus) by 47 and 76 per cent. respectively, both being hard-seeded (Leguminous species).

Longevity Tests of 25 weed seeds have been inaugurated this year.

Adenanthera pavonina.—In a previous trial it was found to have retained its vitality to the extent of 1·6 per cent. after 11½ years (*vide* article in Poona Agricultural College Magazine, Vol. XVI, No. 3, December 1925).

Another test after it was 12½ years old showed no germination and no improvement was found even if the seed testing trays were exposed to Sun-light. All vitality was lost in 12½ years.

A test of Sun hemp. (*Crotalaria juncea*) 3 years' old gave a germination of 39 per cent. only.

Plant Economics and advice

Two hundred specimens were identified for the Government and the public.

The number of inquiries on plant economics dealt with was 88. Of these 18 were regarding drug plants.

Eighty lbs. of dried root of Calatropis gigantea and 95 lbs. of dried roots of Alangium Lamarckii were supplied to Professor Kanga of the Gujarath College, Ahmedabad, for analysis.

The plantation of spineless cactus was extended by 8½ gunthas.

Seeds of the following species were supplied to the persons mentioned against each species :—

1.	Tricholæna rosea ..	Siam.
2.	Jowar varieties ..	Director of Agriculture, Kashmir.
3.	Early types of Kharif jowar.	Agricultural Advisor, Rajkot.
4.	Wheat ..	Mycologist to Government, Central Provinces, Nagpur.
5.	Field beans ..	Agricultural Advisor to Government of India, Pusa.
6.	Seeds of quick growing trees.	Superintendent, Agriculture Farm, Kumta.
7.	Seeds of trees ..	Horticultural Section, Egypt.
8.	Bajri, Jowar and Til seeds .	Laboratory Assistant, Gwalior.
9.	Seeds of indigenous trees ..	Consul for America for Arboretum in Arizona.

The pollen of the following species was collected, and sent to Major Tressider, Surgeon to His Excellency the Governor of Bombay in connection with a research on Hay Fever :—

Andropogon annulatus, Apluda varia, Thelepogen elegans, Andropogon triticeus and Anthistiria ciliata.

Advisory work.—Advice on the improvement of pasture lands was given to various persons.

Researches

Lantana eradication.—The work was continued in two places, one at Donje—a thick forest area infested by Lantana and second at Yerandavna on cultivated land infested by Babul and Lantana. In all 22,500 plants have been treated in various ways and the interim results so far are :—

Yerandavna work.—(1) The treatment of cutting close and painting with poison (Sodium arsenite solution) has given 90 per cent. success.

(2) Cutting away and repainting the fresh sprouts in November 1925 which had appeared as a result of the stimulus of heat (January and May 1925) and the Monsoon (June to November 1925) gave 100 per cent. success so far.

(3) Tarring after painting gives better results.

(4) Spraying small plants with Sodium arsenite solution has been quite effective in killing them.

(5) Spraying small plants with Caustic Soda, Ferrous sulphate and common salt solution have had no effect.

Donje work.—(1) Bored plants showed a death rate of 83 per cent. ten months after treatment.

(2) Cut close plants at the end of 10 months have shown a death rate of 98 per cent.

Bajri Research

The three types of Bajri plants, *viz.*, Leaf base-hairy, Leaf all-hairy, and Leaf not-hairy that have been under observation for the last four years have maintained a consistant behaviour as to yield.

Isolation of strains on the basis of hairiness has now been fully accomplished in four cases and in other cases the extent of success has reached nearly 90 per cent.

Frequency curves have shown that there is no correlation between non-hairiness and yield and that there are high yielding individuals with every degree of hairiness. Nor is there a relation between length of third leaf from top and yield.

Drum experiments for determining the water requirement (or consumption) of Bajri plants were conducted both in Kharif and Rabi seasons and the results show that :—

(1) The amount of water required by a Bajri plant per unit of dry matter was found to be considerably more in the rabi season than in the rains.

(2) The quantity was 173·5 times the dry matter of the plant in the rains and 423 times in the rabi season.

Castor Research.—Study of the different types of castor-oil plants from various parts of India was begun in the Kharif season of 1925. Fifty-two different samples of seed were collected but as these were generally mixtures of apparently different types, each lot was sub-divided into from one to four uniform looking lots. Thus the total numbers of lots sown was 153 and all these were sown one in each row containing six seeds. The total plants studied in the Kharif season of 1925 was a little over 550. Each plant was studied separately as the rows gave in many cases individuals differing in some important respects.

All variations so far seen with respect to size, colour and ornamentation of seed, size of caruncle, inflorescences, stems and petioles, have been studied and recorded so far as the first generation is concerned. Frequency curves of all these variations have been prepared. They show

that there are not many widely differing varieties though many look outwardly very much different from each other.

Potato experiments in 1925 and 1926.—The seed potatoes brought down to Poona at the end of the storage period (May 1925) consisted of Great Scot and Italian White Round varieties. These varieties were cultivated in the Kharif season of 1925 and it was found that Mahableshwar stored varieties Great Scot and Italian White Round yielded 6·94 times the seed sown and 4·35 times the seed sown respectively. While the corresponding varieties of Poona storage yielded five times and seven times the seed sown respectively.

The above result showed the superiority in yield of Great Scot over Italian White Round.

In the rabi season of the year 1925-26 the varieties were cultivated in Mahableshwar and at Poona with the sanction of the Committee controlling the research.

The results were :—

(1) *At Mahableshwar.*—The yields of Great Scot was 10·7 times the seed.

That of old Italian White Round was 4·3 times the seed. That of freshly imported Italian White Round was 7·6 times the seed.

(2) *At Poona.*—Great Scot 5·50 times the seed.

Old Italian White Round 5·00 times the seed. Fresh Italian White Round 2·8 times the seed.

The trial shows that the Mahableshwar yields were better than those of Poona (except in old Italian) and also that the Great Scot yielded more than the common Fresh White Italian.

The respective crops were stored in the hot weather of 1926 in Mahableshwar and Poona. The storage results at the end of hot season 31st May 1926, were as follows :—

1. In Great Scot the total loss due to driage and rot together was 21·83 per cent. at Mahableshwar and 29·63 per cent. at Poona ; the corresponding figures for Fresh Italian White Round was 26·59 and 38·78 respectively.

2. This trial has again shown that Mahableshwar storage is advantageous over Poona storage and that Great Scot is a better keeper than the other variety.

Hot weather results of kharif and rabi cultivation and storage shows that Mahableshwar cultivation and storage has shown better results and that Great Scot variety is better than the local Fresh Italian both in point of yield and keeping quality.

Trial of German Potatoes.—Three varieties reputed to have a high percentage of starch contained were received at the end of February 1926 too late to plant. Since late plantings in Poona are known to end in failure, a part of each of three varieties were transferred to Mahableshwar where one of the best cultivators agreed to cultivate them on certain

conditions. A duplicate set was however cultivated in the hot weather in Poona also. The yield in both places was very poor compared with yields obtained from a normal seasonal crop. The yield of the three varieties in Poona varied between 35 to 1·45 times the seed while that of Mahableshwar crop was between 1·76 to 2·58 times the crop.

Fifty pounds seeds of each of the three varieties are stored in the cold storage at Bombay, while the rest is kept in Poona. The seed would be available for cultivation in the rabi season by which time the seed would be sufficiently rested and quite fit for cultivation.

The local Italian varieties have a starch content between 55·8 and 57·7 per cent. while the German is 62·4 to 65·3 per cent.

Grass Research

Rotational Grazing Experiments.—1. *Chharodi.*—The idea of the scheme of the experiments was to protect an area with a wire fence and to divide it into four blocks of three acres each. Block 1 is to be grazed from July to September, block 2 from October to December, block 3 from January to March and block 4 to be harvested in September the produce being used either immediately or made into silage and the area then grazed from April to June.

By this scheme one block is grazed every year after seeding and is encouraged to revegetate naturally the succeeding year. Thus the whole area will be gradually revegetated without interfering with the grazing of cattle.

The season commenced in right earnest from the beginning of June and continued favourable till the end of August when there was a good and uniform cover of vegetation over the whole area.

The first block was grazed for three months, *i.e.*, August to October. The weights of the two animals admitted to the block before they were taken in for grazing in the block were 1,001 and 1,002 pounds respectively ; these while changing to block 2 were 1,064 and 1,154 pounds respectively.

Block 2 was open for grazing from 1st November 1925 to 15th February 1926. This block was grazed for a fortnight more in order to utilize the produce completely. The animals were weighed as soon as they were taken out of the block and the weights recorded were 1,141 and 1,155 pounds respectively.

Block 3 had vigorous and copious growth by the end of October. The Manager in consultation with the Grass Staff harvested the produce in November as he thought the growth would be too coarse and unpalatable. He realised 6,610 pounds dry, *i.e.*, 2,203 lbs. per acre.

Block 4 was harvested in September as originally settled and the produce immediately utilized for feeding. The outturn was 8,234 lbs. semi-dry, *i.e.*, 2,744 lbs. per acre.

There was practically no second growth in blocks 3 and 4 after they were harvested in November and September respectively. There was no rain after September and everything was dry by the middle of February.

The grazing animals began to feel the heat of the sun and seek the shade outside the experimental area as there were no trees inside.

Blocks 1 and 2 although grazed for 3 and 3½ months respectively had about 50 per cent. of useful forage still left consisting of A. annulatus and I. wightii which are very good fodder at all stages. This fact clearly proves that the blocks were understocked and suggested need of more animals to utilize the produce completely.

Blocks 3 and 4 look quite clean and uniform since they were harvested by mower.

Block 3 was harvested after seeding and is expected to revegetate better the coming year.

Block 4 although harvested in September did not produce any second growth afterwards. This fact and the previous experience of the Manager to that effect, indicate that no grazing is possible after once the area is harvested even as early as September, and suggest modification in the present programme.

Since everything gets dry and the sun hotter from January and there are no shady trees it is advantageous to try seasonal rotational grazing so as to finish the operation by the beginning of January.

It is too early to draw any definite conclusions at this stage. Still the following important points were noted during the course of the year :—

(1) Since anyhow one block was grazed after seeding it may be said that only a part of the scheme was carried out ; this block according to the results of the experiment is expected to increase in vegetation in the coming years as is the experience in the West.

(2) The tendency of the animals to seek shelter and shade as the days get hotter from February shows the necessity of having shade trees on the grazing area.

2. *Bhamburda Forest Area.*—An area of 40 acres was secured with co-operation of the Forest Department and was fenced in August 1925. The area was divided into 4 blocks and arrangements were made with private cattle owners to graze 12 cattle which were to stay on the premises and to graze in the area allotted for them from time to time according to a scheme which permitted shifting of cattle from block to block after a month and a half commencing from the beginning of August. The rainfall prior to August was not favourable to grass growth. The annual seedlings of Andropogon pumilus, Iseilema anthephoroides and Apluda varia got a good start but later succumbed to drought. The perennials such as Andropogon Monticola. A. annulatus, Ischæmum laxum. A. pertusus and A. contortus, though hardy were drought affected and therefore could provide little feeding stuff. They hastened into seed.

The cattle put to grazing in bad blocks became impatient and unruly and consequently had to be transferred to other blocks earlier than was planned before. They were later found to relish the available stuff on account of the Rock-salt provided to them as could be noticed from

their having eaten such grasses as Aristida species even after seeding. At the end of the experiment, the cattle seemed to have gained in health vigour and weight although the latter could not be proved for want of a correct weighing machine.

3. *Padmavati.*—Near a temple of this name there is a mal-land area of 37 acres belonging to 17 cultivators of Parwati village near Poona, an area typical of what exists in several villages. An attempt is being made to improve this area with the co-operation of the cultivators. They agreed to follow the system of grazing proposed by us. Cattle were put to graze in a proper blocks late in the season as the latter was not favourable to rapid growth of grass earlier. The cattle being unaccustomed to remain inside a fixed area, gave trouble. But later on when let into a block which was protected till nearly to end of November gave no trouble as there was enough to eat and as they became a bit accustomed to control. The results have not been striking yet but the people have however been thoroughly convinced as to the efficacy of protection from grazing in the early part of the season. There is still much to be accomplished in the way of securing better co-operation of the landholders in the matter of this trial of rotational grazing.

4. *Jalgaon forest area.*—5. *Pandharpur.*—6. *Kandivli.*—The Scheme of the experiments was approved and accepted by the authorities in charge of the areas mentioned. But the details could not be carried out by them on account of various unforeseen difficulties of securing weighments, wire fencing, etc., coupled with a bad season which damped the enthusiasm of the people concerned though to a small extent, but the difficulties on the path of progress have been fully realized and efforts on improved lines are to be undertaken.

Kalas Plot

General observations.—The unfavourable season—rather one of drought—compared to that of the previous year brought forth its consequential changes in the grass flora. All swampy flora such as Cyperus had disappeared. The algal cover on very low-lying spots did not appear but was replaced by new seedlings of perennial grasses loving moisture but with good drainage—such as Andropogon annulatus which become dominant on these spots. Grasses like Iseilema laxum liking wet soil were meagre while an invasion of comparatively less moisture-loving species such as Andropogon Monticola, A. contortus, A. pumilus and Apluda varia was noticed. Even Aristida species which grow in very poor dry soil were seen to have secured suitable spots in this area.

On the high lying area—the annual species presented very poor growth which finished itself by seeding early in the season. Perennial stumps have not grown satisfactorily as was expected in view of the nature of the season.

Drain.—A drain was prepared to let out water which used to stagnate in the year before the one under report, the stagnation having caused the appearance of a swamp flora which was not good for grazing. The value of the drain could not be tested as the factor of good rain necessary for testing it was not present.

Scientific observations and results.—

(1) Seasonal countings of plant populations in the variously located quadrats were taken to see variations in number at the beginning and end of the year. Our observations point to a considerable reduction in the number indicating a sparser population in an indifferent season than in a normal one. Maps of permanent quadrats confirm the above observations by showing a larger population in 1924 than in 1925.

(2) Records of soil moisture and temperature taken every month in representative places and at different seasons always showed less moisture and higher temperature in the outside area than in the enclosed one.

(3) A study of the effects caused by the local ground fauna was initiated. Ants, rats and wire worms are the agencies concerned in causing disturbance of soil and vegetation conditions. Ants were found to collect grass seeds of some species such as A. contortus, A. purpureo-sericeus separately and heap them at the mouth of burrows.

(4) Burnt and cut area—last year's observations are confirmed.

(5) Grazing—a strip which was reserved was opened for grazing at end of March 1926. On the hilly area almost every thing though dry was eaten by cows while in the low area all that was not of a coarse kind was grazed and in consequence the area was only partially consumed.

(6) Germination tests of seeds—grass seeds saved from enclosed areas gave 38·7 per cent. germination while that from unenclosed areas gave 30·4 per cent. thus showing deterioration in the vitality of seeds from open grazing lands.

Publication.—

"A study of some Indian grasses and grass lands by W. Burns, L. B. Kulkarni and S. R. Godbole, Memoirs of the Department of Agriculture in India, Vol. XVI, No. 1."

Personal

The graduate Staff including those financed by the Sassoon David Trust Fund have done their work faithfully and with sufficient insight both into the scientific and practical aspects of it. The clerical staff have put in a good year's work and they need strengthening for Sir Sassoon David Trust Fund work. The non-graduate fieldmen Staff—consisting of three hands have been very useful, specially I may make special mention of Mr. Ganpat Yesoo Gaikwad, Laboratory Assistant, who attends to Laboratory and teaching equipment work.

G. B. PATVARDHAN,
Acting Economic Botanist.

19th August 1926.

APPENDIX L

Annual Report of the Work done by the Crop Botanist to Government of Bombay, Poona, during the year 1925-1926

Staff.—I held charge of the office of the Crop Botanist to Government of Bombay, Poona, throughout the year. Mr. V. L. Bhosekar, B.Ag., worked as Superintendent of the Rice Breeding Station, Karjat, with Messrs. G. G. Patil and Y. B. Shitole as Non-graduate Fieldmen. Mr. B. Nazareth, B.Ag., worked as Superintendent of the Wheat Breeding Station, Kirkee with Mr. G. H. Joglekar as Non-graduate Fieldman. Mr. K. V. Shinde worked as office clerk.

Work on Rice

Season.—The monsoon broke out early, *i.e.*, on the 27th of May. The rain was heavy and nearly continuous till about the 6th of June. Sowing was therefore delayed till the 9th of June, and went on for about a week or ten days after commencement. The condition of the seedlings at the Rice Breeding Station was satisfactory on the whole, as these seedlings are always grown in special seed-beds. But the general cultivator outside had suffered a good deal owing to damage or bad germination of seedlings due to heavy rains. The transplanting at the Rice Breeding Station was commenced on the 5th and went on till the 15th of July. After transplanting there was a good deal of trouble from crabs this year which caused a number of gaps in some of the cultures. Gaps were also caused probably by the seedlings being washed away by excessive water. Attempts were made to fill up the gaps but the filgaps could not make good growth being continuously cut down to prevent crossing with the main culture. This caused great unevenness in the stand of the crop owing to unequal competition between different plants. Besides the trouble from heavy rains in the beginning, scarcity of rain about the end of September caused anxiety for a week. Fortunately the cause of anxiety was soon removed by good rain. Thus apart from several drawbacks the season was favourable.

Experimental Work

I. Intensive study of selected strains.—Ten strains, *viz.*, Nos. 153, 241, 35, 42, 222, 223, 225, 226, 227 and 237 were studied intensively. The first two of these are intermediate and the rest late in ripening. These were grown in two series to get yield comparisions in duplicate. The special feature of this year's study was the growing of a culture of strain No. 42 alternately with each of the other strains and with six or seven of the cultivators' samples (which were grown for yield comparisions only) for securing more accurate comparison.

The majority of the strains flowered two or three days earlier than usual owing probably to early transplanting this year. Their tillering, height, length of the panicle and yield per plant were more as compared with the three previous years. The following are the statements of the

yield per plant in grams of the different strains and the cultivators' samples in the duplicate series :—

Statement showing the yield per plant of the different strains and cultivators' samples as compared with the average of two check plots of strain No. 42 grown on two sides of each, in duplicate series

Series I

——	Poor plot			Richer plot						
Strains Nos. ..	153	241	Bhadas	C.S.2	Zinya	Gudya	Saphal	Gowad	Bed 42	C.S. 1
Yield of Strains ..	25·90	22·90	26·08	38·32	31·07	35·49	37·42	32·43	31·64	24·15
Average yield of St. No. 42	30·05	29·59	30·10	39·12	39·00	40·25	40·14	38·94	36·33	32·71

——	Normal plot						
Strains Nos. ..	225	226	227	237	222	35	223
Yield of Strains ..	34·45	39·20	31·85	27·91	33·69	35·72	32·08
Average yield of St. No. 42	35·83	37·02	36·30	34·71	35·49	38·32	37·98

Series II

——	Poor plot			Normal plot						
Strains Nos. ..	153	241	Bhadas	C.S.2	Zinya	Gudya	Saphal	Gowad	Tray42	C.S. 1
Yield of Strains ..	23·88	24·38	29·14	32·31	30·84	30·73	33·79	31·97	36·96	32·31
Average yield of St. No. 42	32·03	33·16	30·55	36·34	36·05	36·00	35·71	35·94	36·34	35·43

——	Richer plot						
Strains Nos. ..	225	226	227	237	222	35	223
Yield of Strains ..	30·35	36·72	33·70	28·56	35·43	39·64	36·34
Average yield of St. No. 42	35·16	34·64	35·63	36·45	39·48	42·06	40·25

It will be seen from these that No. 42 has maintained its superiority in all cases except No. 226. But the better yield of No. 226 in the duplicate intensive cultures is definitely due to extra advantage obtained by No. 226 in both the series owing to a large number of gaps in both the cultures. The very poor condition of the filgaps naturally gave mor space to the neighbouring plants and they behaved abnormally well. Hence the better yield of No. 226 in both the cultures. Besides No. 226 had also come up next to No. 42 last year. So the extra

advantage obtained by it naturally enabled it to compete successfully with No. 42.

II. Replications.—No. 42 was also replicated with some of the selected strains and the cultivators' samples for comparison. The following are the results of the replications :—

No. of Replication	Field No.	No. of cultures of 42 alternating with No. of the other smaple	Name of Replication single seedling or bunches transplanted	Ratio of difference to error in favour of No. 42	
1	9	7 with 6 ..	No. 42 with Gowada single seedlings.	4·69	1
2	9	6 with 5 ..	No. 42 with Saphala single seedlings.	Equal	
3	10	7 with 6 ..	No. 42 and C. S. 1 single seedlings.	Equal	
4	11	6 with 5 ..	No. 42 and Gowada bunches of 10 seedlings each.	4·5	1
5	11	6 with 5 ..	No. 42 and Saphala bunches as above.	6·5	1
6	10	6 with 5 ..	Nos. 42 and 226-A planting single.	7·4	1
7	12	6 with 5 ..	Nos. 42 and 226-B single planting.	4·7	1
8	12	6 with 5 ..	Nos. 42 and 225 single seedling.	4·8	1

Note.—The culture of each sample consisted of 3 lines, the distance between lines was one foot and plant to plant 6 inches. The distance between alternate cultures was two feet. The two side plots of 42 were added, halved and compared with the middle one.

It will be seen from this that No. 42 proves to be definitely superior to 226 in this case although there may have been some doubt about it in the intensive cultures. In the replications with bunch planting No. 42 proves to be definitely superior to Gowada and Saphala. But in those with single planting Saphala equals No. 42. So also does C. S. 1. It may be noted that the fields in which these replications were grown had considerable soil-heterogeneity. But apart from these two results No. 42 proves to be generally superior in the replications also.

III. Extensive culture trails.—In these trials plots of one guntha each were used. Bunches containing 10 seedlings each were planted in lines and squares 12″ × 12″ apart. The following are the results of the different strains :—

Strains	Area in gunthas	Actual yield in lbs.	Yield per acre calculated in lbs.	Remarks
Nos. 226 ..	1	89	3,560	Field No. 18.
42 ..	1	112	4,480	
226 (Duplicate) ..	1	107	4,280	
35 ..	1	64	2,560	Field No. 19.
42 ..	1	85	3,400	
225 ..	1	81	3,240	

It may be seen that here also 42 gives higher yields than the other strains. No. 42 was also grown in the cultivator's fashion on a still larger area, *viz.*, 6·39 gunthas for simple multiplication of seed. This field gave an actual yield of 770 lbs. working to 4,820 lbs. per acre.

Some of the early strains were also grown extensively. The following are the results of these :—

Strain	Area in gunthas	Actual yield in lbs.	Yield per acre calculated in lbs.	Remarks
241 ..	1	55	2,200	12″ × 12″ spacing. Each bunch containing ten seedlings.
153 .. (Intermediate)	1	77	3,080	Do. do.
79 .. (Very Early)	2	100	2,000	12″ × 6″ spacing. Ten seedlings in a bunch.

Appreciation of the Kolamba Strain No. 42, by the cultivators.—This strain is now generally appreciated by the cultivators in the North Konkan where its cultivation is automatically spreading.

Further spread of Strain No. 42.—As the Deputy Director of Agiculture, N. C. D., Nasik, had found that Kolamba Strain No. 42 had given an increased yield of over 500 lbs. per acre over the local samples in the Igatpuri Taluka in the Nasik District and as he thought it likely to be in demand, more seed was sent to him for distribution to the cultivators. The profitable cultivation of Strain No. 42 by Mr. Navalkar in Kamshet in the Poona District, in comparision with the local Chiman Sal has induced some cultivators to try it on their own fields. Some seed of No. 42 has therefore been distributed to a few cultivators in that neighbourhood.

Seed of No. 42 was also supplied to the Sawantwadi State for trial.

Further results of these distributions will be watched with interest. Samples of seeds of the different selected strains of Kolamba and of other important rice varieties from the Bombay Presidency were also despatched for experimental purposes to America, Japan and Andaman Islands.

Strain No. 79 has continued to give good results in the Ratnagiri District and in the Baroda State from where there has been greater demand for its seed.

IV. Further selection of samples.—Three bulk samples Nos. 7/6, 10/2 and 37/6, three panicle samples Nos. 273, 280 and 308, two more bulk samples 9 and 28 and several cultures from fresh new panicles collected by Mr. Bhosekar in 1924 were further selected for trial as more or less promising.

V. Study of the F 2 generation of crosses.—In the year 1923, three different rice crosses were made with the object of combining together if possible earliness, fineness of grain, good yield, standing habit and

freedom from sterility. Table "A" shows the names and nature of the parents crossed and of the F-1 hybrids obtained in 1924 from those crosses.

TABLE "A"

Descriptive table of characters of the parents and of the F-1 hybrids

Name	No. of Hybrid seeds obtained	Mean tillering per plant	Period of flowering dates	Density of panicle	Length of panicle C. M.
Strain No. 39 ..	..	8·5	Oct. 1 to 5 ..	Compact.	25·5
,, ,, 164 ..	..	8·0	Sept. 25 to 28 ..	Sparse ..	28·0
F-1 Hybrid* (39 × 164).	3	..	Oct. 3-5 ..	,, ..	..
Strain No. 121 ..	..	7	Oct. 7-12 ..	,, ..	29·5
F-1 Hybrid* (39 × 121).	1	..	Oct. 5 ..	,, ..	..
Strain No. K. O. 37 ..	..	5·5	Oct. 7-12 ..	,, ..	26·5
F-1 Hybrid* (39 × K. O. 37).	2	..	Oct. 5 ..	,, ..	..

Name	Sterility at top	Size of grain M. M.	No. of grains per gram	Strength of straw	Plant yield in grams
Strain No. 39 ..	Present ..	7·15 × 2·12	87	Weak ..	26
,, ,, 164 ..	Absent ..	9·16 × 2·30	57	Strong ..	25
F-1 Hybrid* (39 × 164).	,, ..	8·24 × 2·20	68	Weak ..	..
Strain No. 121 ..	,, ..	9·11 × 2·75	48	Weak ..	28
F-1 Hybrid* (39 × 121).	,, ..	8·01 × 2·18	..	Weak ..	..
Strain No. K. O. 37 ..	,, ..	8·10 × 3·04	45	Strong ..	35
F-1 Hybrid* (39 × K. O. 37).	Nearly absent.	7·75 × 2·35	66	Weak ..	..

The following is the summary of the results obtained from the study of the F-2 progenies in the year 1925 :—

Lateness of flowering is dominant to earliness in the reciprocal crosses between Nos. 39 and 164. The ratios obtained between the late and early plants in F-2 were 2·84 to 1 and 2·75 to 1 respectively. In the third cross of this kind the ratio obtained between late and early plants was 1·4 to 1. But this cross was probably contaminated and might be disregarded with regard to this character.

In the crosses 39×37 and 39×121 such a clear dominance of the late plants to the earlies as in the above two crosses was not noticed. The curves obtained were not clearly bimodal as in these cases, but pretty

* The F-1 plants were all grown in pots. So they were not quite comparable with the parents in some respects.

nearly normal. This is suspected to be due to the presence of cumulative factors, at any rate in the former cross, since the co-efficient of variability is much increased in the F-2 progeny as compared with any of the parents. But in the cross 39 × 121 the F-2 progeny does not show an appreciable increase in the co-efficient of variability and hence it is not certain if this indicates the existence of cumulative factors or only a normal fluctuation about a common mean as in any pure line. (2) Tillering :—The curves obtained in the cross 39 × 164 are nearly normal. This seems to be due to fluctuation about a common mean rather than to the effect of cumulative factors as the parents of this cross 39 × 164 are nearly alike as regards tillering. In the crosses 39 × 37 and 39 × 121 the curves obtained are nearly normal again. But in the former it is suspected to indicate the existence of cumulative factors while in the latter merely a fluctuation about a common mean. Because in the former case the parents are appreciably different as regards tillering and the co-efficient of variability is much increased in both the crosses as compared with the parents. In the latter case however it is more likely to be a fluctuation about a common mean than the effect of cumulative factors as the parents are very little different from each other. The increased co-efficient of variability in this case is probably due to the edge effect on some plants which thus produced more tillers. (3) Density or compactness of the panicle :—In the crosses 39 × 37 and 39 × 121 sparseness seems to be dominant to compactness, the ratio between sparse and compact being always approximately 3 to 1. Density was not properly worked out in the cross 39 × 164 though a similar result was indicated in it also. Compactness seems to be generally associated with short grains (6 to 7·5 m.m. or so in this case) and also with sterility at the top of the panicle. (4) Length of the panicle :—This is suspected to show the existence of cumulative factors, since the co-efficient of variability is increased in the F-2 as compared with the parents. (5) Grain length :—This seems to indicate the existence of cumulative factors in all the crosses under 39 × 164 where alone this character was studied in detail. But similar indications are obtained in the other crosses also. (6) Standing habit :—This seems to be correlated with erectness of the flag. This habit is due to the presence of mechanical tissue in the hollow stem of the rice plant. It is represented by an arch formed by a few small sized thick walled schlerenchymatous cells behind the air cavities, which connects the schlerenchymatous sheaths of the fibrovascular bundles lying on either side of the air cavity. There are indications that the lodging habit is dominant to the standing habit in the F-1 hybrid. (7) Yield is of course a complex character but it is positively correlated with tillering.

In conclusion there are good indications of obtaining early maturing, fine or coarse grained, rather good yielding types in the cross 39 × 164 and especially in one culture of getting very early types of this nature. If these are realised, we may get some types of economic usefulness.

Because there are very few early types with good yield and fineness available. There are indications of getting good yielding late types with fine or coarse grains from the cross 39×37. There are also indications of getting good yielding late types with fine or coarse grains from the cross 39×121.

If these are actually realised attempts will be made to isolate from them types with standing habit and as little sterility as possible.

VI. New crosses made during the year.—About 15 crosses were made this year of which nine have formed seed and are expected to be successful. Six of these were between Nos. 39 × 42, the object being to combine fineness of grain and good yield. The remaining three crosses were between Nos. 39 × 104. The object in this case was to combine fineness of grain, good tillering, good yield, standing habit and absence of sterility.

I have to place on record my appreciation of the good work done by the staff during the year in spite of the great increase of work owing to the study of the F-2 progenies.

Work on Wheat

Locality.—Ganeshkhind Botanical Gardens, Kirkee.

As in precious years the land in Ganeshkhind Botanical Gardens was given all the necessary tillage operations from May onwards. During the months of August and September, practically no rain was received, but in October from the 8th to the 12th there was a fall of an inch and a half. Sowing was therefore put off till 20th of October 1925.

It was intended, this year, to grow the crop without irrigating it, but the dry conditions of the previous two months and the lack of moisture in the soil, later, necessitated irrigating the whole area. Hence after sowing, a general irrigation was given on November 5th, 1925.

However, there were gaps in several places—more particularly in the replicated series, where towards the East side of the plot, due to the poverty and shallowness of the soil, seed in strains Nos. 162, 171, 186 and 200 failed to germinate. Though resowing was done and hand-watering given to ensure proper and quick germination, these late seedlings made a poor and slow growth and failed to give any satisfactory results.

The rest of the crop had a fairly good stand. There was no rust until the beginning of January, when flowering had commenced. But the moist conditions produced by the late rains received in December and January, brought in the rust attack. This was, however, not so intense; and some comparative study confirming our previous results could thus be made. Pusa 4, was affected only to a slight extent, while the rust resisting strain of Khapli—though it had suffered from excess of water—had no rust on it.

Cultures under study.—The 16 selected pure strains, were grown this year, with a view to test their yield and rust resistance under absolutely dry conditions. These were grown in duplicate series. Due to the rains, however, the desired object could not be achieved. There was a slight attack of rust on all the strains, which in certain cases, has thus

affected the yield. In one of the duplicate series a low yield in strains Nos. 167, 168, 200, 210 and Pusa 4 has been obtained, due to the greater number of gaps and the attack of rust. Strain No. 278 yielded poorly in both the series. This is a very late strain and is more liable to rust.

But the other strains have yielded fairly uniformly. There were four rows representing one strain, with a border line on either side, each row being placed at a distance of a foot and a half. Two seeds were dibbled in each hill at four inches apart. The total number of hills in each strain were counted and from the total yield of the plants in the four rows, the yield per hill was calculated.

Table of Yields of Study Cultures

St. No.	Series I			Series II			Average of the two series
	Number of hills	Yield in grams	Yield per hill in grams	Number of hills	Yield in grams	Yield per hill in grams	
52 ..	233	482	2·06	201	454	2·25	2·15
103 ..	252	539	2·15	208	794	3·81	2·89
162 ..	217	510	2·35	138	454	3·28	2·71
167 ..	250	680	2·72	205	368	1·80	2·34
168 ..	210	397	1·89	207	425	2·05	1·97
171 ..	225	737	3·27	219	510	2·33	2·80
186 ..	250	850	3·40	256	312	1·22	2·29
200 ..	265	595	2·25	226	368	1·63	1·96
210 ..	270	680	2·52	247	482	1·95	2·24
212 ..	266	709	2·67	253	539	2·13	2·40
224 ..	232	737	3·13	250	652	2·61	2·88
228 ..	200	505	2·97	267	652	2·24	2·67
237 ..	239	539	2·25	224	624	2·78	2·51
278 ..	166	312	1·87	158	283	1·79	1·83
Pusa 4 ..	199	227	1·14	241	539	3·06	1·74

It will be seen from the average of the two series that Nos. 103, 162, 171, 224 and 228 stand out prominently even under the adverse conditions of the year. Nos. 171, 186 and 228 happened to give higher yields this year in series I, as they had derived some extra advantage of the nearness of the water channel. Pusa 4 on the other hand, had suffered owing to withholding of water in the dry cultures.

A third series of all the strains, with Pusa 4, as standard, was replicated in another strip. Three rows of each strain were alternated with three rows of Pusa 4, five and six times respectively and a comparative study of the yields of all the strains has thus been obtained.

The figures given below represent the total yields of the strains in the 15 and 18 lines respectively of the replicated series in the "A" plot with Pusa 4 as a standard.

Strain Nos.	Yield in lbs.	Strain Nos.	Yield in lbs.
	Lbs. oz.		Lbs. oz.
52	8 11	200	6 5
Pusa 4	9 6	Pusa 4	5 2
103	11 10	210	10 1
Pusa 4	10 3	Pusa 4	11 6½
162	10 0	212	7 7
Pusa 4	10 10	Pusa 4	8 10
167	9 13	224	11 8
Pusa 4	10 1	Pusa 4	12 2
168	6 14	228	9 15
Pusa 4	8 3	Pusa 4	11 3
171	6 10	237	7 5
Pusa 4	7 10½	Pusa 4	8 8
186	6 12	278	6 13
Pusa 4	6 6½	Pusa 4	9 0

Pusa 4 has given more yields in all cases except two. But this was due to its earliness and consequent escape from rust attack. All the strains including Pusa 4 were again replicated in another strip with No. 162 as standard.

Below is given a table which gives the yields of the replicated strains, with 162 as standard :—

Strain Nos.	Yield in lbs.	Strain Nos.	Yield in lbs.
	Lbs. oz.		Lbs. oz.
52	8 13	210	7 2
162	9 6	162	7 0
103	7 7	212	6 14
162	7 5	162	7 7
167	6 15	224	6 4
162	7 5	162	7 12
186	8 4	228	6 4
162	8 5	162	6 1
Pusa 4	7 10	237	6 14
162	9 15	162	7 14
200	7 2	....	....
162	7 12	....	....

The following table gives the average performance of the different strains on the basis of the above two results :—

Strain No.	Plot "A" yield	Plot "B" yield	Total	Average	Rank
	Lbs. oz.	Lbs. oz.	Lbs. oz.	Lbs. oz.	
52 ..	8 11	8 13	17 8	8 12	5
103 ..	11 10	7 7	19 1	9 8½	1
162 ..	10 0	7 13	17 13	8 14½	3
167 ..	9 13	6 15	16 12	8 6	7
186 ..	6 12	8 4	15 0	7 8	9
200 ..	6 5	7 2	13 7	6 11½	12
210 ..	10 1	7 2	17 3	8 9½	6
212 ..	7 7	6 14	14 5	7 2½	10

Strain No.	Plot "A" yield	Plot "B" yield	Total	Average	Rank
	Lbs. oz.	Lbs. oz.	Lbs. oz.	Lbs. oz.	
224 ..	11 8	6 4	17 12	8 14	4
228 ..	9 15	6 4	16 3	8 1½	8
237 ..	7 5	6 14	14 3	7 1½	11
Pusa 4 ..	10 5	7 10	17 15	8 15½	2

It will be seen from the above figures that strains Nos. 103, 162 and 224 have given as high yields as Pusa 4 even here. For the last three years these very strains have been persistently giving high yields in our trials, and have behaved in like manner on the Government Farms, at Jalgaon and Dharwar and on cultivators' fields at Nasik.

Report from Government: Farms for the year under report

Jalgaon.—Even under the adverse conditions of the year, report from the Jalgaon Farm is satisfactory and confirms the previous reports. Strains Nos. 224, 162 and 103 have given good yields and the Superintendent remarks that Strain No. 224 particularly has given good results and that it was found superior last year also.

Dharwar.—Below is given a table of results of the selected strains as compared with Pusa 4 and Pusa 12 and the local, obtained from the Superintendent, Dharwar Farm :—

Variety	Grain in lbs. per acre	Chaff in lbs. per acre	Value per acre	Net profit per acre
			Rs. a. p.	Rs. a. p.
Local ..	742	1,694	80 6 10	68 12 0
Pusa 4 ..	679	840	63 6 9	51 12 9
Pusa 12 ..	656	679	59 3 4	47 9 4
S. No. 103 ..	877	924	74 15 7	63 5 7
" 162 ..	812	840	73 4 6	61 15 6
" 167 ..	812	840	73 4 6	61 15 6
" 224 ..	826	924	75 9 6	63 15 10

The above results show better yields from all our strains. But curiously enough, the net profit in money value is found to be less. This was said to be due to the less production of straw, owing probably to slight attack of rust. But the valuation of grain of the selected strains was said to be slightly higher than the local.

The only drawback of our strains seems to be the lateness by about 15 days, wherein they are some times liable to the attack of rust. It is our endeavour now, by hybridization, to evolve early and rust resisting types with higher yields.

Hybridization work.—From the limited seed obtained from the F-1 generation, after the heavy attack of rust of the previous year, a further study of the important characters of the F-2 generation of certain crosses has been made. Splitting in the different characters has been studied and further study and selection from F-3 is now in hand.

A few plants which indicated a much better resistance to the attack of rust than the susceptible parent have been obtained and these now will form the basis of the desirable types obtainable during the next generation. This was particularly the case in the cross Khapli × 168, where we had as many as 82 plants in the F-2 generation, from which we have selected some early and rust resisting types.

The following is the number of seeds obtained from each plant in the various cultures :—

F-2 No. of plants living in F-2	Parents crossed	No. of good seed obtained which will produce F-3
1 ..	Pusa 4 × 52 ..	26
2 ..	Pusa 4 × 52 ..	5
1 ..	Pusa 4 × 162 ..	28
2 ..	Do.	138
3 ..	Do.	29
4 ..	Do.	90
5 ..	Do.	32
1 ..	Pusa 4 × 168 ..	148
1 ..	171 × Pusa 4 ..	53
2 ..	171 × Pusa 4 ..	16
82 ..	Khapli × 168	Lot of seed.
(5) Selected		

This year some further crosses were made with the object of combining high yield, earliness and rust resistance of the strains mentioned below :—

Table showing the parents crossed and the number of hybrid seeds obtained

Parents	No. of flowers pollinated	No. of seeds obtained
52 × Pusa 4	16	6
162 × Pusa 4	13	5
162 × Pusa 4	10	4
162 × Pusa 4	11	2
Pusa 4 × 162..	14	1
Pusa 4 × 162..	16	1
103 × Pusa 4	16	2
103 × Pusa 4	14	12
103 × Pusa 4	7	4
Pusa 4 × 103..	20	12
224 × Pusa 4	12	7
Pusa 4 × 224..	14	3
210 × Pusa 4	12	9
210 × Pusa 4	14	13
Pusa 4 × 210..	18	6
228 × Pusa 4	7	4
Pusa 4 × 228..	16	6
168 × Pusa 4	22	9
Pusa 4 × 168..	13	10
Pusa 4 × 168..	13	12
Athani × Pusa 4	17	7
Athani × Pusa 4	11	2
Pusa 4 × Athani	4	1
Khapli × 103..	22	17
103 × Khapli	10	8

In conclusion I have to say that had it not been for the unfavourable conditions brought on by the late rains at all the places where our selected strains were tried we would certainly have got much better results this year. This may be seen from the fact that our strains have been consistant in their good behaviour for the last three years or more.

I would here express my appreciation of the work done by the staff and by Mr. Shinde, the office clerk.

R. K. BHIDE,
Crop Botanist to Government of Bombay, Poona.

APPENDIX M

Annual Report of the work done under the Plant Pathologist to Government, Bombay Presidency, Poona, for the year 1925-1926

Staff

(1) The section of Plant Pathology continued to be in temporary charge of the Economic Botanist to Government, Bombay Presidency, Poona.

(2) Mr. M. N. Kamat, B.Ag., continued to act as Assistant Professor of Mycology *vice* Mr. G. S. Kulkarni, M.Ag., on deputation to Cotton Research Work.

(3) Mr. J. S. Malelu, B.Ag., acted as Assistant Mycologist during the year.

Educational

The usual University courses in Compulsory and Optional Plant Pathology were given to students at the College of Agriculture, Poona.

A lecture and domonstrations in vernacular on Plant Diseases in general and Diseases of Sugarcane in particular were given to the Special Sugarcane Class at Manjri during Christmas week 1925.

Routine work

The total number of specimens received and identified was 60.

Research

Gummosis of Citrus Trees.—Measures of treatment against this rapidly spreading malady were continued and the number of gardens treated during the year were four and the total number of plants 514. A careful survey of all the gardens that received treatment last year was made with a view to ascertain the measure of success attained and the result was as follows :—

A total of 586 plants in four localities (Baramati, Junnar, Poona and Rahata) were treated on dates between June 1924 and September 1925 out of which *85* per cent. revived and the rest were failures.

The treatment given consisted of first carefully scraping off the affected bark round about the brown discolouration and the gum, washing the spot and painting it with a uniform film of either Bordeaux paste or carbolic acid and then covering the entire wound by a thin paint of tar.

Isolations from the bark in the neighbourhood of Gummosis lesion have given a number of organisms of which a *Phycomycetes* fungus, a species of *Fusarium* and *Cephalosporium* are of general occurrence.

These organisms are now being used in pure cultures, for the infection experiments.

Fruit Rot of Mosambi.—This is of common occurrence in the Ahmednagar district and was discovered during the visits made by the Acting Assistant Professor of Mycology, in connection with Gummosis work. In the gardens visited the Fruit Rot was found in association with

Gummosis and these two maladies are suspected to be related to each other.

The organism isolated from the Fruit Rot was found after a number of inoculation experiments to be parasitic upon Fruit and is a *Phycomyceteous* fungus, probably *Pythiacystis citrophthora*. The parasitic nature of this fungus upon fruit has been proved.

Fusarium Wilt of Potato.—The experiments carried out so far have definitely proved the presence of two distinct types of infection, *viz.*, (1) vascular infection apparently brought about under field conditions and (2) the type of infection that sets in Khoka Rot under storage conditions. The former is destructive under field conditions and reduces the yield markedly. The latter gives apparently vigorous plants and normal tubers, which, however, bring out Khoka infection when transferred to store.

The pure cultures gave no positive results.

Rust of Fig (*U. fici*).—This is a common annual trouble in Fig orchards causing considerable damage every year. The plants when heavily attacked are completely defoliated, the bearing is seriously arrested and the fruits are shrivelled up, are devoid of juice and do not develop normally.

Two sprayings with half-normal Bordeaux mixture given rather late in the season when the disease was on, though effective in preventing reinfection, did not give conclusive results.

New Diseases.—Many more cocoanuts reported to have dropped down while still immature, were examined and in all cases they gave pure growth of a species of *Diplodia*. Examination was also made on the spot (in affected cocoanut orchards) with nuts at different stages of development, with similar results. The infection in the vast majority of cases is brought about at stalk end.

Publications.—(1) "Gummosis of Citrus trees" by Mr. M. N. Kamat, B. Ag., Assistant Professor of Mycology, published in Agricultural College Magazine Vol. XVIII, No. 2 September 1925.

The research work mentioned above was carried out by the Ag. Assistant Professor of Mycology.

G. B. PATWARDHAN,

Poona, 13th July 1926. Plant Pathologist to Government,
Bombay Presidency, Poona.

APPENDIX N

Annual report of the work done by the Soil Physicist to the Government of Bombay, Manjri Farm, during the year 1925-26

Mr. V. A. Tamhane, M.Ag., M.Sc., Soil Physicist to the Government of Bombay was in charge of the work till 17th of May 1926. He then went on three months leave. I was in charge of the work from 17th of May to 17th of August 1926.

Famine is a very pressing problem in the Bombay Presidency and the work of my branch is mainly so directed as to find out by research the best possible method of cultivation to avoid or reduce as far as possible the occurrence of famine in areas of precarious and scanty rainfall. It has been ascertained that even if all the facilities for irrigation were fully utilized, still in Bombay Presidency proper (that is excluding Sind) not more than about 30 per cent. of the cultivable area can be saved from the in-roads of famine, so that about 70 per cent. of the cultivable land must ultimately depend upon the annual rainfall. Now it is known that there are certain parts in the Bombay Presidency, such as, the Bombay Deccan and certain parts of Gujarat, where rainfall is so scanty and fitful that agriculture in these parts is looked upon as a gamble with rain ; and yet we find that in many such places the total annual rainfall is usually more than theoretically required for a full crop of Jowar or Bajri, etc. It is obvious, therefore, that in some form or other an appreciable amount of rainfall is wasted with the result, that the crops suffer for want of water and famine becomes inevitable. It is to prevent this waste of water and find out the best possible means to harness rain-water, for the utilisation of crops that a Dry-Farm Experimental Station was opened in the year 1924 at the Manjri Kuran land, about half a mile away from the well known Manjri Sugarcane Farm. This place was selected because it is on the border line of a very bad dry tract ; and has comparatively much lower rainfall than Poona, Ahmednagar or Sholapur ; and especially during the year under report the station received remarkably little rain, *i. e.*, 11·65″ as compared with Poona 17·38″, Ahmednagar 16·50″ and Sholapur 22·59″ (from June to October). Help is also given to the public as well as to the other branches of the Department in matters relating to physical conditions of soils whenever these are referred to me.

Dry-Farming

The land selected is at a high level and has therefore no special advantage of percolation water coming from the surrounding country and increasing the store of water in the soil, which therefore consists only of the rain water that naturally falls on the land. It was possible to divide the land into two portions, one consisting of soil with depth varying from 9″ to 2 feet and the other consisting of soil 2 to 5 feet deep.

The shallow land was reserved for experiment on Bajri and the deeper portion was reserved for a crop of Jowar.

Experiments were then planned with the main object in view to store in the soil as much of the rain water as was possible and make it available to the growing crop of Rabi Jowar in the first instance. This was done by:—

(1) Ploughing deep to a depth of 9″—12″ and harrowing two or three times so as to increase the storing capacity of the soil, a good time before the monsoon set in.

(2) By levelling the plots and putting small bunds round each plot to prevent "Run off" even when heavy rains fell within a short time.

(3) By repeatedly stirring the surface of the soil so as to create a soil mulch to prevent evaporation of water that had entered the soil.

(4) By adding green manure so as to increase the water retaining capacity of the soil without lowering the water supplying power of the soil (as indicated by Laboratory experiments).

A number of plots were laid down in the year 1925, each plot being of one guntha (1/40 of an acre) in area. Three such plots were assigned to each experiment; so as to get a better confirmation of results obtained in each of the plots. Seed (Kalbondi Jowar) was dibbled by hand in each of the plots at a distance of 18 inches so that the distance between any two rows as well as the distance between any two plants was 18 inches. This facilitated interculture on all sides of the plants, which helps a good deal in stopping evaporation and thus conserving moisture for the proper development and growth of plants.

In each plot all the plants on the two diagonals were marked and kept under observation through out their growth. The result of this close study brought to light the fact that in the case of Rabi crop, if all the precautions for storing rain water and conserving soil moisture, such as those stated above are taken, the distribution of rainfall which is generally supposed to be very important may be made to play only a secondary part, the total amount of rain being left as the factor of prime importance. It may, however, be pointed out that for ideal conditions for rabi Jowar at places like Manjri about half to three-quarters of the total rainfall from June to November (that is about 10 to 15 inches out of 18 to 20 inches) should come down before sowing time, and the remaining half to one-fourth of the rainfall that is 5 to 10 inches after the seed is sown.

It is also possible to increase the yield of a crop to a certain extent by different methods of cultivation.

The following table shows how the yield of the crop differed with different treatments in the experimental plots during the year 1924 (a year of good rainfall) and 1925 (a year of scanty rainfall).

The table showing the yield of grain that is outturn per acre (calculated by excluding ring plots) :—

	1924 Good rainfall Grain	1925 Scanty rainfall Grain
	Lbs. Ozs.	Lbs. Ozs.
Plot I control (no bunds and 1″ mulch) ..	776 2	347 2
Plot III (bunds and 2″ mulch)	825 8	421 3
Plot VII (green manure in 1924 and 1″ mulch and bunds) and no green manure in 1925 but 1″ mulch	1,136 3	417 10
Plot VIII fallow in 1924 and 1″ mulch and bunds	....	454 0
Plot XI (trenches filled in with loose soil in 1925)	....	553 13

From the above it will be seen, that in the year 1924 of abundant rainfall the addition of green manure has given excellent results, the yield being 50 per cent. more than the yield in the control plot.

It was expected that the effect of green manure would last for a year or two more, but it appears from the figures of yield in the year 1925 that the yield in plot VII is about the same as in plot III, which received no green manure.

In the year 1925 (of scanty rainfall) Plot No. XI stood highest as regards yield of grain. It appears, therefore, that making the soil more porous by digging trenches in rows and filling them up with loose soil and sowing directly in the filled up trenches is one of the most important factors helping to increase the yield of the crop. The importance of this factor seems to be greater in a year of scanty rainfall, on account of the less cost than green manure and a safer device to use when there is no prospect of a very good rainfall. It may however, be pointed out that after the trenches were dug and left open for about ten days from 12th to 22nd September a rainfall of 1·89 came on before the trenches were again filled up with the loose soil and pressed under the foot to make the land level. It is likely that this amount of rain water was locked up safe in the trenches, and was more useful to the growing plants in their later stages, as could be seen from the green colour of the plants which persisted for a longer time as compared to the colour of the plants in most of the other pots.

The yield from fallow (during the year 1924) stands next, being only 454 Lbs. as against 554 Lbs. from plot No. XI. It is, therefore, doubtful (if we leave the question of soil exhaustion apart) whether the practice of fallowing will ultimately prove to be economical, especially when other methods of cultivation can well compete and even surpass it.

Bajri

Preliminary experiments on Bajri were done on similar lines as of Jowar. In one series of plots in which no attempt was made to impound rain water by putting bunds, but in which the water that entered the soil was conserved by soil mulch, the total yield per acre (calculated by

excluding ring plots) was 366 Lbs., while in another series of plots, which had small bunds and where rain water was not allowed to run off the surface, and where 2″ mulching was kept the total yield per acre was 438 Lbs.

In another series of experiments the distance from plant to plant was changed but the distance from row to row was kept fixed at 1½ foot. In this series the plot in which the distance from plant to plant was 6 inches gave the best yield, *viz.*, 748 Lbs. per acre. Next to that stood the plot with 9″ distance, the yield being 737 Lbs. If the distance from plant to plant is increased above one foot, that is 15 inches and 18 inches the yield goes down. The above experiments on Bajri will be repeated this year.

Experiments at Mohol

The Deputy Director of Agriculture, S. C. D., was kind enough to reserve for me a small area on the Mohol Farm for experiments in Dry-Farming. A few experiments were then tried at that station to see if the results obtained at Manjri could be corroborated in the dry tract near Sholapur. The experiments there corroborated the fact that small bunds on level land were efficient in storing rain water running off the surface with the results that the outturn in a bunded plot was always more than that in a plot without any bunds, interculture being common to both.

The experiments, with the addition of some more which have shown to be promising at the Manjri Kuran land, are being repeated during the year 1926-27.

Staff

The staff is found inadequate to cope with the increased work in the field and in the Laboratory besides the potculture experiments which have to be undertaken.

Accommodation at the Manjri Farm

Since the transfer of my Headquarters from Poona to Manjri in the year 1924 a great inconvenience is felt for want of accommodation for my staff. As yet, no permanent arrangement is made, which is badly needed to keep the staff contented.

G. M. BAPAT,
for Soil Physicist to the Government of Bombay,
Manjri Farm.

APPENDIX O

Summary of Work done by the Live Stock Expert to Government for the Year 1925-26

Charge.—During the year under report Mr. H. G. Baluch, B.Ag., held charge of this section of the Department from July until 1st January, when Mr. E. J. Bruen took charge after returning from 9 months leave.

Propaganda.—The Live Stock Expert with his 3 Divisional Inspectors practically covered the whole Presidency giving advice, helping Co-operative Societies, Development Associations, Public Bodies and private individuals with advice on Dairy Farming and Cattle-Breeding. The use of silage and the castration of bulls were demonstrated where possible. The work of placing out Premium Bulls is a great deal more difficult than is generally imagined. The difficulties are :—

I. *Seasonal.*—In a dry season it is particularly difficult to get any person to accept the responsibility of taking care of a bull.

II. For the Khillari tract bulls can only be purchased twice a year in British territory and twice a year in Native States and these during the months of November and January. If agents are unable to attend, a whole year is lost as no bulls are available except at fairs.

In Gujerat and Dharwar District the demand is fairly brisk and the Farms can only just cope with the demands. The Willingdon Cattle Farm, Sindh, is now in a position to put out bulls, district propaganda is now required, this section of the Department has no district staff in Sindh.

General.—All the staff in my section of the Department have done very well and especially so Mr. D. S. Patel, Divisional Inspector of Cattle-Breeding, N. D., and Mr. Y. K. Phadke, my 2nd Clerk, who has had a great deal of work thrown on his shoulders recently.

Northcote Cattle Farm, Chharodi

Staff.—Mr. V. G. Desai, B.Ag., held charge of the duties of Manager for the whole year with the exception of about 3 months. Mr. M. G. Patel was Assistant Manager for nearly the whole year with the exception of a month and a half, when he was deputed to act as Manager, Willingdon Cattle Farm, Phihai (Sind).

Season.—The season as a fodder growing year was well above the average, the monsoon breaking on the 2nd June 1925 and continuing in July and August ; from August onwards little or no rain was recorded, which meant a scarcity of drinking water for cattle for the remainder of the year.

Hay-making.—The timely rain was very beneficial to the growth of grass. The hay-making operations were taken in hand on the 7th September 1925 and completed on the 30th January 1926. 8,30,573 lbs. of hay were harvested at a cost of Rs. 2-3-1 per 1,000 lbs. this price including cutting, carting and stacking. The cost of harvesting has steadily been reduced from Rs. 5-3-7 per 1,000 lbs. to Rs. 2-3-1, the reduction being due to the introduction of 4 new mowing machines on the farm.

Grass-ensilage.—During the year 5,46,642 lbs. of green grass silage was prepared at a total cost of Rs. 4,236-9-6.

Cultivation.—During the year 72·1 acres of land were cultivated and put down to fodder crop, jowari, Bajri and oats being the main crops grown. Two and a half Gunthas of Elephant grass yielded at the rate of 80,704 lbs. per acre of green grass, 8½ Gunthas of Kikuyu yielding 8,932 lbs. per acre and 30 Gunthas Lucerne yielding at the rate of 4,510 lbs. per acre.

Breeding herd.—Breeding operations to improve on the existing herd were continued, the main objects being kept in mind being, trueness to type, early maturity, regularity in calving and increasing the milking capacity without interfering with the draught qualities of the breed. The type of the animal is improving wonderfully well each year. The monthly average milk yield per head has increased from 208 lbs. in 1924-25 to 236 lbs. during the year under report. The milking of the cows was taken in hand in December 1920.

In 1921-22 the farm had six animals yielding over 1,500 lbs. of milk per lactation and the average of the milking herd was 438 lbs. During the year under report 32 animals have given over 1,500 lbs. of milk and the average yield has increased to 1,330 lbs. per lactation, a most creditable performance, considering that there are no facilities for feeding or tying the milking herd. To secure early maturity in a herd is a slower business. In 1921-22 the average age at which cows calved for the first time works out to 5·5 years, during the year under report the period has been reduced to 4 years and 9 months, a fair number calving under 4 years. This particular quality can only be secured by good breeding, provided of course good feeding is given. For this purpose the progeny of 4 bulls was studied during the year. Bull Mohan shortening the period by 1 year and 6 months whereas Bull Nawab's progeny only calved 2½ months earlier than their dams (*vide* Statement No. I), this in itself will show the necessity of using known bulls.

During the year under report 166 calves were born as against 127 of the year previous. The death rate has been considerably reduced.

Rinderpest has not occurred on the farm since 1922-23, similarly with other diseases. This is undoubtedly due to the fact that the farm has now its own water-supply, whereas formerly the cattle obtained their drinking water from a tank, which could owing to its situation be used by outside cattle.

During the year 62 head of cattle were sold for Rs. 5,066.

Bulls.—Seven bulls were put out on the Premium System during the year. The total strength of the herd in the year was started with 480 head of stock and on the last day of the year 547 head of cattle were present on the farm. The total cost to Government on the farm for the year was Rs. 28,470, including Manager's pay, T. A. postage, etc., works out to a cost of 2 annas and 3 pies per animal per diem.

General.—The farm was able to help very materially in saving 600 head of adult stock and their calves by giving cheap grazing for this number of cattle for 4 months.

If it had not been for this assistance, there is no doubt that many of these would have died as the year was a particularly bad one. The part of the Presidency was over run by cattle from the Kathiawar States.

Cattle Breeding Farm, Bankapur

Staff.—Mr. A. B. Gadagkar held charge of the farm for the year with the exception of 28 days whilst on leave. In addition to his own duties Mr. Gadagkar did the work of Divisional Inspector for three months.

Season.—The monsoon made its appearance on the farm in July, very late for this part of the country, with the result that the grass and the cultivated crops had a set back. The whole year was a poor one from every point of view.

Hay and Silage.—The farm was only able to cut and make into silage some 92,118 lbs. of green grass as against 118,730 lbs. the previous year and no hay at all was made, owing to the very poor rainfall. Owing to the increase in the herd, it has been found essential to purchase each year a grazing area, from this area 91,350 lbs. of hay was harvested in addition to grazing the herd. The farm has now taken over this area and it is hoped that even better results will be forthcoming.

Land.—The farm as previously reported is situated in an old fort measuring some 122 acres. The farm was totally covered with cactus and lantana, besides sites of old buildings. This had all to be cleared, the debris removed and the land at first made suitable for grazing. Small patches have now been sufficienty cleared to use mowing machines and an area for cultivation.

Cultivation.—Four acres and 29 gunthas have been cleared sufficiently to bring under cutivation, 2 acres and 10 gunthas were put down to jowar, which yielded 12,972 lbs. of dry kadbi and Rs. 82 worth of seed, samples from this crop receiving second prize at the Dharwar Show, 26 gunthas were put down to maize, which yielded 7,103 lbs. green. One acre and 33 gunthas were put down to Nilwa jowar, this was cut green and fed to cattle yielding 26,929 lbs. of green fodder.

Silage.—Ninety-two thousand one hundred eighteen pounds of green grass silage was made during the year.

Live-stock.—The year commenced with 131 head of live-stock and closed with 155 head, an increase of 14 head in all. Twelve cows, 5 heifers and 5 male calves were sold during the year, these being undesirable. In addition to this 7 bulls were put out on the Premium System. Ten deaths occurred on the farm, 6 of these were killed by panther. The cast cattle sold realized Rs. 1,025 and the Premium Bulls valued at Rs. 2,800.

Milking Experiment.—The Amrit Mahal, purely a draught animal giving little or no milk.

It has been thought necessary to try and improve the milking quality so as to make the animal more economical. In all 6 animals were taken in hand and it has been ascertained that at present the Amrit Mahal

is capable of giving only about 5·3 lbs. of milk per diem for a period of about 78 days. The yields of the daughters of these will now be watched for improvement.

Early Maturity.—During the year under report 12 farm bred heifers calved for the first time. The appended table (*vide* Statement No. II) which is very interesting shows what can be achieved by careful feeding, mating and selection. The recognised age of first calving of the Amrit Mahal is 5·5 years, this in itself is an achievement.

Regularity of calving.—The Amrit Mahal is naturally a shy breeder calving at the earliest every eighteen months. The farm has 65 adult cows, of these 54 calved this year and it is hoped that when more farm bred stock take the place of those purchased, even better results will be forthcoming.

During the year under report all animals over six months of age were immunized against Rinderpest by the Serum. Simultaneous method, similarly all youngstock above six months and below one year were vaccinated against Black Quarter, two of the most dreaded diseases that claim large tolls each year. The farm is now fairly safe as regards these diseases.

Buildings.—The farm was originally started with one cattle byre to accommodate about 20 head of live-stock. The increased demand for accommodation has been met by erecting fairly substantial temporary lean to sheds. Similarly to house machinery a temporary structure has been provided, which answers the purpose very well. The farm is now fairly well complete but for servants quarters, which are urgently needed.

Willingdon Cattle Farm, Phihai

Staff.—The farm was very unfortunate from the management point of view. Mr. B. B. Jamaspjina, the Manager, unfortunately fell ill from a septic hand from 22nd January till 29th July 1925. During this period the farm was managed by Mr. Kotumal J. Advani, non-graduate fieldman, as no more experienced person was available. During this period the farm had a very bad set back. Then for a month and half, from 1st April to 15th May 1926 Mr. Jamaspjina again went on leave. During this period Mr. M. G. Patel, B.Ag., acted, he was doing quite good work.

Season.—The farm registered a few cents of rain in July 1925 and no further rain fell during the remainder of the year. Consequently the grass crop was very poor, only sufficient grazing for a couple of months being the total output from the grass lands. The output of hay and grazing entirely depends on summer and winter rain, these have unfortunately been bad ever since the farm was taken over.

Cultivation.—The Willingdon Cattle Farm, Phihai, has now 25 acres under fodder crops, an increase of 10 acres over last year—

(i) Dry Fodder, (ii) Green Fodder and (iii) Grazing.

Owing to this tract not being certain of any rain, it has become necessary that all fodder requirements must be raised by irrigation. An experiment

is now being tried to grow Kikuyu grass, a very fine pasturage grass by irrigation, at present only about 1 acre is down to this very valuable grass but it is hoped to extend it sufficiently to enable the young calves and in-calf cows getting a certain amount of green grazing throughout the year.

The 25 acres at Phihaj and about 12 acres at Landhi yielded a total of 806,590 lbs. of green feed at a total cost of Rs. 6,728-6-9, working out at 13 annas 4 pies per 100 lbs.; the local price of such is Rs. 1-8-0 per 100 lbs.

Wind-breaks and fence.—In this tract the wind is excessive, being hot in the summer and cold in the winter. It is therefore essential both for live-stock and crops that some form of wind-breaks be established on all farms. It is difficult to procure a wind-break, which will be cattle proof at the same time.

The following are being tried :—

(*i*) Casuarina (Casuarina Muricata).
(*ii*) Joseph's Beard (Parkinsonia Aculeata).
(*iii*) Euphorbia (Euphorbia Tirrucali).

Casuarina makes an admirable wind-breaks but is not cattle proof. It requires nursing and looking after for at least the first two years of its growth.

Joseph's Beard makes an excellent fence and wind-break and does not require very much attention.

Euphorbia makes a good wind-break as well as a fair fence but unfortunately, owing to the very vicious fluid, it gives off when broken, it is harmful to cattle, which get blistered from the juice. Further trials are essential before the right type of fence can be recommended for this tract. Another great necessity in this area is shade trees for cattle, this is still under investigation.

Herd.—On the farm are maintained two herds : (i) the Karachi or Red Sindhi and (ii) a small herd of Thar Parkar. The objects of this farm are :—

(*i*) To improve the milking qualities of this breed.
(*ii*) Early maturity.
(*iii*) Regularity of breeding.
(*iv*) To improve the udder.

The Sindhi although a fairly good milker has a long ill-shaped pendulous udder, which gives a great deal of trouble and is owing to its shape apt to get injured easily. One of the principal features of improvement is to improve the udder.

(*v*) To breed bulls to place out as Premium Bulls. To achieve this end animals possessing as near to these qualities have been purchased and by selection and judicious cross, it is hoped that in a few generations an animal possessing all the desired qualities will be bred on the farm. The farm now has 40 cows, out of which 20 giving over 4,000 lbs. of milk per lactation, of these 2 have

given over 8,500 lbs. 2 over 6,500 lbs., and 9 over 5,000 lbs. At this farm since the growth of the calf both male and female is so essential that all calves suckle their mothers, these figures are therefore at a disadvantage of at least 15 per cent. on the total yield over farms that wean their calves. The calves bred on the farm are a distinct improvement on their dams. The annual average taking the milking period and dry period into account, *i.e.*, 365 days of 12 cows that have completed over three lactations on the farm averages 11·7 lbs. per day, a very creditable performance. The farm produced 176,976 lbs. of milk exclusive of that taken by the calf. This gives a daily average of 16·25 lbs. over the whole herd for the year.

During the year under report 7 breeding bulls each having in its pedigree one or more of the desirable qualities have been tried, we now must necessarily wait for results. The breeding and improvement of cattle is slow but the figures quoted above will show that in three years great strides have been made in the progress of improvement.

The farm is now working on four families or strains of cows, each of which has reached the 6,000 lbs. of milk-yield mark. One family has milking capacity, one family has size, one family has good udder development and the fourth a low set small animal. Some of these have soft hoofs, others have hard hoofs and by breeding and selecting between these families, an ideal animal should be produced. The herd especially the young stock are now getting more uniform in colour and conformation and it is doubtful if a herd equal to this exists in India.

Dairy or commercial side.—The farm produced 176,976 lbs. of milk during the year, of this 174,518 lbs. was sold. Unfortunately owing to the situation of the farm—13 miles from Karachi by bad road, the farm is only able to realize Rs. 4-10-2 per 82½ lbs. of milk, which works out to a fraction over 10 pies per lb. The most expensive part of an animal diet is the bulk food or fodder at the farm, this is produced at 13 annas 4 pies per 100 lbs. If a good market could be found for the produce, the farm would go a long way to be self-supporting.

Propaganda.—The farm was instrumental in introducing and obtaining good lucerne, berseem and wheat seeds into the locality. After seeing crops raised on the farm, cultivators soon followed the farm's example. Elephant grass, a wonderful perennial fodder giving very large yields, has been introduced into the district from the farm.

The progress in every department has been very satisfactory.

Co-operations of the Bombay Gowrakshans at Kandivalee and Mulund

Kandivalee Gowrakshan.—At this farm Government in co-operation with the Bombay Gowrakshak Mandali are breeding pure bred "Gir" bulls, which are used universally all over the Presidency being good milkers and good draught cattle.

The farm started with 40 head of as pure Gir cows and two bulls as were available, to-day the herd has in all 92 head of live-stock. The farm has 14 young bulls, the property of Government, which will be fit to be put not on the Premium System this year.

The annual yield per cow reported last year was 2,052 lbs. per lactation, the year under report this has increased to 2,386 lbs. per lactation, a very appreciable increase.

The Gowshala has taken up the matter of silage feeding in great earnest. Last year the Gowshala had two silos and this year they have five silos. One of the silos is so placed along the public road to attract public attention, silage feeding being demonstrated at the show held at the Gowshala.

The Gowshala have completed their water scheme for water in all cattle stables for washing down the stables ; this is a great improvement, moreover the washing will be conducted on to the cultivated land.

The total cost of feeding the cattle on the farm amounted to Rs. 7,211, the price realized for milk being Rs. 6,658 leaving a loss of Rs. 553. This loss is amply earned by the 54 young stock on the farm.

E. J. BRUEN,
Live-stock Expert,
Bombay Presidency, Poona.

STATEMENT No. I

CHHARODI FARM

Statement showing the effect of bulls on early calving

Serial No.	Name of the bull	Number of cases examined	Average age at which the daughters had their first calving	Average age at which the dams had their first calving	Improvement (5 — 4)	Remarks
1	2	3	4	5	6	7
			Y. m.	Y. m.	Y. m.	
1	Mohan ..	7	3 10½	5 4½	1 6	
2	Kachari ..	9	4 8½	5 2	0 5½	
3	Navab ..	8	5 4	5 6½	0 2½	
4	Sultan ..	6	4 10½	5 5½	0 7	

STATEMENT No. II

BANKAPUR FARM

A Statement showing the age of heifers at first calving

Serial No.	Brand No.	Name of animal	Date of birth	Date served	Date calved	Remarks
1	66	Kausalya ..	21 9 21	31 5 25	31 3 26	
2	67	Kumari ..	8 12 21	21 4 25	10 2 26	
3	69	Champawati ..	16 10 21	12 4 25	1 2 26	
4	70	Arundati ..	24 12 21	1 7 25	11 4 26	
5	73	Natani ..	12 3 22	28 6 25	29 3 26	
6	75	Chapla ..	25 2 22	17 8 25	19 5 26	
7	77	Nagavalli ..	25 2 22	28 6 25	14 4 26	
8	78	Dharani ..	12 3 22	21 6 25	1 4 26	
9	80	Uravashi ..	15 12 21	31 5 25	3 3 26	
10	83	Shakuntala ..	14 2 22	14 4 25	23 1 26	
11	85	Rakhama ..	29 10 22	10 6 25	19 3 26	
12	86	Bharti ..	27 2 22	21 5 25	1 3 26	

E. J. BRUEN,
Live-stock Expert to Government,
Bombay Presidency, Poona.

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APPENDIX P

Annual Report of the Agricultural Engineer to Government, Bombay, Poona, for the year 1925-26

The activities of the Department can be conveniently summerised under the following heads or sections :—

(1) Modification of Agricultural Implements and Machinery.
(2) Technical Advice and Higher Technical Assistance.
(3) Famine work including Pumping and Boring.
(4) Running of Plants.
(5) General.

Section 1

Modification of Agricultural Implements

Orient Plough.—Modifications of the Orient plow were further continued until satisfactory results were obtained, after exhaustive trials both in Sind and at Manjri Farm and the special features of the completed machine can be briefly stated as under :—

(1) Quadrant fixed on the pole to allow of guide handle adjustment.

(2) Connecting bar from pole to slade improved to give a wider range of adjustment.

(3) Mould board support bar and slade rivited together and bar modified to give greater side suction and reduce cost in manufacture, such as welding.

(4) Method of fixing body of plough to pole improved thereby reducing time required to adjust.

(5) Cost of plow reduced from Rs. 38-8-0 to Rs. 20 including share.

This improved model has been found to be very useful on light soils and at the same time about 40 per cent. reduction in price is obtained.

Seed Drill.—Experiments were carried out by attaching the seed-box mentioned in the last report to an indegenous seed drill specially modified to suit varying conditions and the completed seed drill with the improved box comprises many necessary improvements. It is self acting as regards feed and can deal with any kind of seed on almost any soil.

It is made out of very common material without any sacrifice to its quality or strength and is fitted with two adjustable land wheels, a hopper with automatic feed, a seat for the driver and an automatic rope drive tension arrangement. The yoke is so arranged that it can admit any size of bullocks. When the machine is drawn the land wheels and axle revolve and since the seed box spindle is driven from this axle, the box automatically operates as soon as the machine is in motion. The wheels keep the machine balanced and secure uniform depth sowing. Moreover the wheels can be raised or lowered from 2″ to 5″ on the specially designed brackets to suit the conditions of the soil and the depth of sowing required. The seat provides more comfort to the driver and enables him to drive the bullocks and also see to the proper working of the machine without

difficulty. The drill can be fitted with special cups or boxes to suit different seeds. Thus 3 or 4 types of cups practically deal with almost all kinds of seeds. Exhaustive experiments with this drill at Manjri have proved it a great success. The specification is briefly given below :—

Specification of Seed Drill—One new and improved seed drill complete having automatic and positive feed, including seed box for jowar with rope drive from main axle and having tension pulley and quadrant, one teak wood main frame to which are attached drive shaft with wooden drive wheels and adjusting brackets giving a range of from 2 to 5 inches depth of sowing, bamboo pipe conveyor for seed from distributing box to coulters, three teak coulters with special hard point and clips complete with standard pole and adjustible yoke for different size of bullocks and fitted with driver's seat and special land wheel scrappers and spare seed boxes for sowing bajri, cotton and wheat.

Plough Share.—The special plough share and point mentioned in the last report, designed for a C. T. 2 Plough was given exhaustive tests at the Jalgaon Farm in Khandesh and the results obtained indicate that it is a great success. The Superintendent of the Farm writes :—

" The plough with the new share was worked in black soil for 17 days. The measurements of the tip of the share were taken every day. The tip of the plough share has minimised 1/16 inch in 17 days. It is seen that the quality of the steel seems to be superior to ordinary shares supplied, and the share can be used for considerably longer time than ordinary share. The bamboo pin was not required to be replaced and works alight and does not allow the tip of the share to slip off. This year owing to rains in the month of January, the soil was in ideal conditions but from the wearing action of the point of the share it is seen that it will last considerably longer time than ordinary shares even when the soil is hard. "

Winnower.—I am now continuing the modification of a winnower to meet the requirements of the agriculturists in this country and I shall be able to give some tangible results during the Presidency Show. The chief aim is to reduce the power required to the absolute minimum and to arrange the riddles in such a way that the machine will deal with any kind of grain at the minimum cost, and to put on the market a much better and cleaner sample.

I am sorry, I have not been able to give this subject the attention it requires owing to the extra work, famine boring has involved.

This section however is now my most important function and since the staff, workshop and workmen are more conversant with this special work of modelling and testing I anticipate a much greater output in future.

Section II

Technical Advice and higher Technical Assistance

We had 123 inquiries during the year under report for advice, out of which 27 were for pumping, 64 for boring, 1 for ginning, 13 for mechanical

cultivation including tractoring, 2 for blasting, 2 for cane crushing and 14 for general purposes.

There were 75 applications for admission to the oil engine class attached to the shops out of which 22 students were admitted and 18 went through the course successfully.

Two pumping plants were on hire during the year under report, one to Mr. Supnekar of Supna, district Satara, and the other to Mr. Saswadkar of Poona at Rs. 220 and Rs. 200 per year as hire charges, respectively.

Four hand boring machines have been converted into power at the P. W. D. Workshops, Dapuri under my personal supervision and the Calyx power machine at Palghar in Konkan Division has been fixed on a trolley and fitted with suitable steel derrick and a new engine to conform to the modern type of machines. The Wizard engines on the two converted Musto machines in Konkan Division were put right at the request of the Deputy Director of Agriculture.

A new G-31 Calyx drill was purchased and tested for the Deputy Director of Agriculture, Gujrath, and fitted with a special large steel girder frame and a steel derrick to render it more efficient and convenient to operate. Besides this several other minor works have been executed for the various divisions in addition to scrutinising their annual indents for stores and tools and plant and making out 31 drawings for repairs.

Considerable time and attention had to be devoted to the exhibition at Alandi, a place about 13 miles from Poona at the time of the great fair when one F-3 Calyx drill, a combined self-contained pumping plant, a kite motion pump, a fire engine pump, and a bore hole hand pump were demonstrated.

In addition to the above 3 tractor ploughs were demonstrated of the following description :—

(1) 12—20 case tractor with 3 furrow Grand Detour Mould Board Plow.

(2) 14—30 McCormick tractor with 3 furrow Mould Board Plow.

(3) Beeman tractor with a small single furrow plow.

My Assistant went to Sind in connection with the erection of the pumping plant at Sakrand Research Station. The plant consisted of 2 portable steam engines each driving a 6″ centrifugal pump through a counter shaft. The plant is practically duplicated and the capacity of each unit ranges from 500 to 750 gallons per minute according to necessity The plant can work in full, singly or diagonally as required.

Section III

Famine work including Pumping and Boring

Boring.—The workshop and the Superior staff were kept very busy during the major portion of the year in assembling and testing the 35 hand boring machines and 11 power drills purchased for famine work. These machines were equipped with necessary outfit so as to make them

really efficient and easy to handle in the districts. In addition to the above work 41 raw men were trained in operating the hand machines and 15 trained in operating the rotary power machines, also the 2 Boring Assistants sent from Gujrat, and Southern Division received the necessary training. During the latter part of the year we worked 20 hand machines and 8 power machines in the district with the help of one additional Boring Overseer and the work done throughout the Presidency, excluding Sind, with the newly trained raw and inexperienced hands under the most unfavourable circumstances can be briefly stated as under :—

Number of bores made by hand machines 55.
Total footage bored 3,717′-11″.
Number of bores made by power machines 23.
Total footage bored 3,737′-11″.

Further details of the working of the above machines will be found on the prescribed schedule attached herewith.

It is necessary to remark here that the present method of conducting famine boring work may be improved upon. At the moment more than half a dozen Officers are involved in continuous correspondence. This has not only increased the clerical work to a great extent but also led to endless confusion. The system followed is not common to all for whom work is undertaken and the work is by no means centred for efficient supervision and greater output. Machines meant for very shallow work have to be used for deep borings at a great sacrifice of efficiency and output and the scattering of the machines over the districts has rendered efficient supervision absolutely impossible. The works undertaken can be classed in the following five ways :—

(1) Machines owned by the department but worked by the District Boards and controlled or supervised by this office.

(2) Machines owned and worked and controlled by this department entirely for the Water Diviner to Government.

(3) Machines owned by the department and worked and controlled by the Deputy Director of Agriculture but financed by this office.

(4) Machines owned by the department but temporarily worked by the Deputy Directors of Agriculture.

(5) Machines owned by the department but worked, controlled and supervised by the District Local Board and Revenue Authorities.

The above will thus give an idea as to how matters are likely to be complicated resulting in less work and more correspondence and greater worry and anxiety.

In the circumstances the amount of work done is much more than was expected and it appears advisable to review the whole matter and devise simpler methods of administration for the future.

Famine Pumping.—In this connection 20 pumping sites have been inspected in Ahmedabad and Bijapur Districts on the rivers Sabarmati, Krishna and Ghataprabha. But the majority of sites in Bijapur District

are unsuitable on account of greater lift, long length of pipe line and the river banks and lands being frequently affected by the high water level during floods. As regards the sites in Ahmedabad District although the lift is comparatively smaller still with the exception of two sites the same conditions prevail as in Bijapur. Statement of approved sites is attached herewith.

I was not able to survey all the sites on account of the pressure of other works.

I have at the shops 7 famine pumping sets ready for use in case of an emergency and I shall be adding 2 more to the above if the steam ploughing tackle is not sold.

Section IV

Running of Plants

Nangaon Pumping Plant.—The pumping plant at Nangaon irrigated 328 acres of land out of which 72 acres were on perenial crops and 256 acres on seasonal crops. The total expenditure incurred amounted to Rs. 11,643-9-0 and the total revenue realised is Rs. 3,563. The plant ran for 293 days in the year all told, out of which it worked 24 hours continuously for 48 days.

Karajgi Plant.—The power baling plant at Karajgi worked much better this year as a result of the institution of stiffened knives to the Bruiser; and the elimination of stones in the feed hopper. The total bales turned out in the whole season amounted to 16,610 of 82 lbs. average weight against 6,409 bales turned the previous year. The total weight of the bales pressed amounts to 607 tons, 2 quarters, and 26 lbs. out of 9,697½ Katts (local measure) of fodder purchased. With a view to overcome the difficulty of breakdowns I kept my assistant Mr. Paranjpe at Karajgi for some time to train men, make adjustments, and ensure smooth running of the plant. The result is not only the increased number of bales and longer running of the plant with minimum amount of breakdowns but the cost of the finished bale has dropped from 11 annas 8 pies to 6 annas and 10 pies per finished bale. I am however obliged to point out that although the machine may deal with any kind of kadbi, it is no use purchasing any sort of stuff simply to keep the machines fully employed. The object of the plant is to store sufficient amount of bruised and pressed kadbi to save cattle during bad years of famine and as such the best sort of kadbi in return for the money spent is essential. Experience during the last two years proved that infected, bent, and rotten kadbi tends to increase the number of breakdowns. Similarly green kadbi has a tendency to choke the machine. It is essential to store it sufficiently in advance so as to feed the machine with as dry kadbi as possible.

Section V

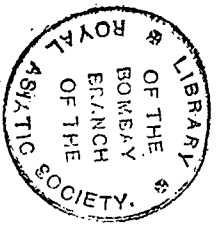
General.—The work in connection with the Presidency Agricultural Show has added considerably to my multifarious activities and I expect

this state of things will continue for some considerable time. As Secretary to the Implement and Machinery Section I am required to conduct a good deal of extra correspondence with the public connected with the Show and in addition have other works of varied nature. The testing of wells in the College grounds the designs of booths for the Implement and Machinery Court and preparing the machinery on the Experimental Well or Water Court in readiness for the Show, are cases in point.

We were greatly honoured this year in having a visit from H. E. The Viceroy, H. E. The Governor of Bombay, the Honourable Minister, the Director of Agriculture and other Officials and private gentlemen. The preparation of this involved much extra work. The satisfaction expressed, however, amply repaid us for all our efforts.

The year under report has probably been the most strenous I have known and it gives me much pleasure in being able to record that the members of my staff have risen to the occasion and have laboured long and ardously to enable me to cope with the work.

W. M. SCHUTTE,
Agricultural Engineer to Government, Poona.



Details of Boring,

Serial No.	Name of well-owner	Taluka	Village	Diameter of bore
	Poona District			
1	Leper Asylum	Haveli ..	Kondhana ..	3"
2	Mr. Kikabhai Premchand	Do. ..	Poona ..	3"
3	Mr. N. R. Atole	Bhimthadi ..	Sirsuphal ..	3"
4	Mr. Kikabhai Premchand	Haveli ..	Poona ..	3"
5	Mr. D. V. Dunakhe	Indapur ..	Galandwadi ..	6"
6	Messrs. Bhong Brothers	Do. ..	Nimbgaon ..	6"
7	Mr. D. G. Gholane	Do. ..	Kotki Nimbodi ..	6"
8	Mr. S. N. Gujar	Do. ..	Lasurna ..	6"
9	Taluka Local Board	Do. ..	Loni .. Devakar ..	6"
10	Do.	Do. ..	Varkute ..	6"
11	Do.	Do. ..	Bhavdi ..	6"
12	Mr. Dhadphale	Havdi ..	Pimpal-Gurav ..	3"
	Nasik District			
13	Mr. T. D. Borade	Dindori ..	Madki-Jamb ..	3"
14	Mr. H. D. Somawanshi	Do. ..	Do. ..	3"
15	Mr. V. R. Dodage Patil	Do. ..	Do. ..	3"
	Satara District			
16	Taluka Local Board	Koregaon ..	Koregaon ..	3"
17	Do.	Do. ..	Do. ..	3"
18	Do.	Do. ..	Do. ..	3"
19	Do.	Khanapur ..	Bhalawni ..	3"
	Nagar District			
20	Taluka Local Board	Nagar ..	Walki ..	3"
21	Do.	Do. ..	Do. ..	3"
	Bijapur District			
22	District Local Board	Bijapur ..	Hitanalli ..	6"
23	Do.	Bagewadi ..	Mangoli ..	6"
24	Do.	Do. ..	Bagewadi ..	6"
25	Do.	Do. ..	Do. ..	6"
26	Do.	Do. ..	Ingaleswar ..	6"
27	Do.	Muddebihal ..	Muddebihal ..	6"
28	Do.	Do. ..	Do. ..	6"
29	Do.	Do. ..	Do. ..	6"
30	Taluka Local Board	Badami ..	Teggi ..	3"

1925-26

Depth bored	Water before boring in gallons per hour	Water after boring in gallons per hour	Departmental charges	Remarks
Ft. in.			Rs. a.	
32 0	Surface bore ..	250	32 0	Pump fixed by the Department.
50 0	Do. ..	250	50 0	
43 6	Do. ..	21	43 8	Demonstration bore.
50 0	Do. ..	250	50 0	
195 0	Negligible quantity. ..	15	....	
50 0	*Nil* ..	10	....	
50 0	*Nil* ..	24	....	
50 0	*Nil* ..	80	....	
127 0	*Nil* ..	40	....	
131 6	*Nil* ..	50	....	
61 0	*Nil*	32	....	
50 0	Surface ..	6	50 0	Demonstration bore.
12 6	*Nil* ..	1,000	12 8	
15 0	*Nil* ..	*Nil* ..	....	
6 0	*Nil* ..	250	6 0	
56 6	*Nil* ..	24	....	
36 0	Surface ..	250	36 0	
50 0	*Nil* ..	*Nil* ..	....	
40 0	*Nil* ..	*Nil* ..	....	On hand.
7 6	*Nil* ..	250	7 8	
5 6	*Nil* ..	250	5 8	
81 6	Surface ..	150	....	Site selected by the Water Diviner.
70 6	Do. ..	125	....	
60 0	Do. ..	120	....	
41 6	Do. ..	250	41 8	
55 0	*Nil*	Water tapped.	....	Not tested.
12 0	*Nil* ..	*Nil* ..	....	Stopped at the request of the well-owner.
17 0	*Nil* ..	*Nil* ..	....	
35 0	*Nil* ..	*Nil* ..	....	
30 0	Surface ..	Water tapped.	....	Not tested.

Serial No.	Name of well-owner	Taluka	Village	Diameter of bore
31	Taluka Local Board	Badami ..	Teggi ..	3″
32	Do.	Do. ..	Katgeri ..	3″
33	Do.	Do. ..	Do. ..	3″
34	Do.	Do. ..	Do. ..	3″
35	Do.	Do. ..	Do. ..	3″
36	Do.	Do. ..	Hulusgeri ..	3″
37	Do.	Do. ..	Do. ..	3″
38	Do.	Bagalkot ..	Bhagavati ..	3″
39	Do.	Do. ..	Do. ..	3″
	Dharwar District			
40	Mr. L. P. Patil	Ranebennur ..	Halgeri ..	3″
41	Do.	Do. ..	Do. ..	3″
42	Mr. M. V. Rattihalli	Do. ..	Do. ..	3″
43	Mr. V. M. Andanevar	Do. ..	Do. ..	3″
44	Mr. Mallapa Kadar	Do. ..	Do. ..	3″
45	Mr. Mallapa Kirabar	Do. ..	Do. ..	3″
46	Mr. L. P. Patil	Do. ..	Do. ..	3″
47	Mr. Kunchur	Do. ..	Ranebennur ..	3″
48	Mr. Gurusyantappa Santapa Bidri ..	Do. ..	Hammanhalli ..	3″
49	Mr. Shivangauda Gangangawda ..	Do. ..	Do. ..	3″
50	House Building Society	Haveri ..	Haveri ..	3″
51	Mr. Kalamdani	Do. ..	Do. ..	3″
52	Mr. V. S. Naik	Do. ..	Deogiri ..	3″
53	Do.	Do. ..	Do. ..	3″
54	Do.	Do. ..	Do. ..	3″
55	Mr. Mallapa Naik Tatti (Taluka Development Agriculture Association)	Hangal ..	Alur ..	3″
56	Mr. Santachyar Katti	Do. ..	Balambid ..	3″
57	Mr. Tippanna Gawli	Do. ..	Alur ..	3″
58	Mr. R. S. Patil	Hirekerur ..	Bhogavi ..	3″
59	Mr. Ramanna Betagiri	Do. ..	Tadas ..	3″
60	Mr. Sidiappagauda Mallorgawda ..	Do. ..	Shrigambi ..	3″
61	Mr. Bhimama Sankapa Banakar ..	Do. ..	Do. ..	3″
62	Mr. Rudraya Huchaya	Do. ..	Gudad-Mallapur ..	3″
63	Mr. Shivangawda and others ..	Do. ..	Hirekerur ..	3″
64	Mr. Kalyangawda Bharamgawda ..	Do. ..	Dudihalli ..	3″

Depth bored	Water before boring in gallons per hour	Water after boring in gallons per hour	Departmental charges	Remarks
Ft. in.			Rs. a.	
34 0	Surface ..	250	34 0	
25 0	*Nil* ..	250	25 0	
70 0	*Nil* ..	250	80 0	
23 0	Negligible ..	250	23 0	
29 6	*Nil* ..	250	29 8	
65 0	Surface ..	*Nil* ..	....	Stopped at owner's request.
118 0	Do. ..	*Nil* ..	....	
28 0	Do. ..	*Nil* ..	....	Stopped at owner's request.
77 9	Do. ..	*Nil* ..	....	Do.
17 4	*Nil* ..	250	17 8	
11 0	100 Gallons ..	250	11 0	
30 0	Do. ..	1,000	30 0	
44 0	Surface ..	250	44 0	
32 6	*Nil* ..	250	32 8	
27 0	Negligible quantity. ..	1,000	27 0	
9 0	250 gallons ..	1,000	9 0	
24 6	*Nil* ..	250	24 8	
30 2	*Nil* ..	180	....	
17 9	*Nil* ..	1,000	17 12	
14 6	*Nil* ..	500	14 8	
69 3	Surface ..	Water tapped.	....	Not tested.
65 4	750 Gallons ..	Do. ..	....	Do.
19 10	*Nil* ..	Do. ..	....	Do.
17 8	*Nil* ..	Do. ..	....	Do.
82 0	Surface ..	250	98 0	
8 6	*Nil* ..	500	8 8	
72 0	Surface ..	Water tapped.	....	Not tested.
45 0	Do. ..	250	45 0	
15 0	*Nil* ..	250	15 0	
50 0	Surface ..	250	50 0	
60 0	Do. ..	250	65 0	
80 0	Do. ..	*Nil* ..	....	
80 6	Do. ..	250	95 12	
60 0	Do. ..	250	65 0	

Serial No.	Name of well-owner	Taluka	Village	Diameter of bore
65	Mr. Somapa Huchagauda	Hirekerur ..	Haunsabhai ..	3"
66	Mr. Kariyapa Kenchapa	Ranebennúr ..	Battikop ..	3"
67	Mr. Patil on behalf of the public ..	Hirekerur ..	Chapparhalli ..	3"
68	Mr. Sidapa Usf. Gawdapa	Do. ..	Kodamgi ..	3"
69	Mr. B. H. Malogi	Do. ..	Makri ..	3"
70	Mr. S. L. Desai	Shiggaon ..	Shiggaon ..	3"
	Surat District			
71	Taluka Local Board	Bardoli ..	Syadla ..	6"
72	Mr. Murarbhai K. Patil	Do. ..	Surali ..	6"
	Kaira District			
73	Gavthan	Anand ..	Boriavi ..	6"
74	Survey No. 2010	Thasra ..	Dakore ..	6"
	Panch Mahals			
75	Mr. Prabhudas Jibhai	Godhra ..	Kashipura ..	6"
76	Khan Bahadur Mahamad Miya ..	Do. ..	Moti Katadi ..	6"
77	Taluka Local Board ..	Dohad ..	Jessawada ..	6"
	West Khandesh			
78	Taluka Local Board	Dhulia ..	Dhulia ..	6"
			Grand Total	

Poona, 19th August 1926.

Depth bored		Water before boring in gallons per hour	Water after boring in gallons per hour	Departmental charges		Remarks
Ft.	in.			Rs.	a.	
35	0	Surface ..	250	35	0	
31	6	*Nil* ..	250	31	8	
25	0	*Nil* ..	250	25	0	
65	0	Surface ..	250	72	8	
30	0	*Nil* ..	500	30	0	
65	4	Surface ..	Water tapped.	....		Not tested.
71	6	*Nil* ..	250	82	4	
7	0	Negligible ..	*Nil* ..	....		Left incomplete on account of monsoon.
100	0	Surface ..	550	125	0	Demonstration bore.
95	0	Do. ..	150	....		On hand.
38	0	No water ..	Water tapped.	....		Left incomplete. Not tested.
17	0	*Nil* ..	*Nil* ..	....		On hand.
34	0	*Nil* ..	250	34	0	
99	0	Surface ..	*Nil* ..	....		On hand.
3,737	11			1,631	1	

W. M. SCHUTTE,
Agricultural Engineer, Bombay Presidency, Poona.

Statement showing particulars of Famine Pumping sites in Bombay Presidency approved :—

Register No.	District	Taluka	Village	River	Area available in acres
1	2	3	4	5	6
155	Bijapur	Indi ..	Agarkhed ..	Bhima ..	Not stated ..
Nil	Ahmedabad ..	South Dascroi.	Piplaj ..	Sabarmati ..	100

Register No.	Approximate total left in feet	Size of pump and Power of Engine required for area	Survey No.	Remarks
1	7	8	9	10
155	60′	5″ Pump and 25 B.H.P. engine.	Not stated ..	Suitable. There is already a Pumping Plant of the Jahagirdar Brothers.
Nil	40′	6″ Pump and 20 B.H.P. engine.	61 and 78 ..	Two sites (good worth consideration.)

W. M. SCHUTTE,

Agricultural Engineer, Bombay Presidency, Poona.

Poona, 19th August 1926.

APPENDIX Q

Annual Report of the Horticulturist to Government, Bombay, Poona, for the year 1925-26

Changes in Staff

Mr. H. P. Paranjpye acted for Dr. Cheema as Horticulturist to Government up to 9th December 1925, and Mr. P. G. Dani took acting charge of the post of District Horticultural Officer. Due to transfers two new graduate assistants also were taken in this section.

Financial conditions

Financial conditions for the year 1925-26 are as follows :—

	Sanctioned grant	Expenditure	Receipts
	Rs.	Rs. a. p.	Rs. a. p.
(1) Office of the Horticulturist including District Horticultural Officer, Poona	3,800	2,897 5 0	....
(2) Ganeshkhind Botanical Gardens, Kirkee ..	10,780	10,779 12 4	3,314 14 0
(3) Modibag, Agricultural College	7,590	7,572 14 10	2,565 7 0

The grants of the G. B. Gardens are decreasing every year considerably. During the year under report a great deal of difficulty has been experienced in maintaining green houses, flower beds, and avenues up to the proper standard.

Including the value of the seeds and plants distributed free of charge to the cultivators, fruits supplied to the laboratory and classes and fodder raised for Live-stock, the income of the Modibag amounts to Rs. 4,319.

Teaching Work

Teaching work in Horticulture has immensely increased on account of the fact that the University authorities have prescribed a course in canning for Degree students in the College and have declared Horticulture as Optional subject. In addition to the Professor of Horticulture, the District Horticultural Officer and the Superintendent, Modibag, are devoting part of their time in order to carry out work according to College time-table. It is extremely necessary to have one whole time Assistant Professor of Horticulture on the teaching staff of the Horticulturist to Government to conduct work satisfactorily as was suggested in Government Order, Revenue Department, No. 12179 of the 13th November 1919.

Investigation Work.—Besides teaching work, our investigation as well as advisory work has increased immensely. During the year under report two bulletins and two research papers have been submitted for publication. These bulletins deal with the lemon Industry in Italy and Fig industry in Asia Minor the study of which was made on the spot by Dr. G. S. Cheema. The details of other investigation work are summarized as under.

Laboratory Work.—The results of juice work, drying of fig and banana, and cold storage experiments are given in the previous reports. This

year a great deal of attention has been paid to the canning of mango pulp and figs, preparation of fig jelly, and transport of mango fruit to distant places.

Canning of Mango pulp.—Canning of mango pulp (Pairi) has been done to a certain extent. Different periods of exhausting and processing pulp in cans have been tested. These results require to be confirmed before any final conclusions are given.

Canning of Fig.—Various tests have been made in canning figs. Figs have been canned in different strengths of sugar solution, as for instance, 10, 20, 30 and 40 per cent. It is observed that 30 and 40 per cent sugar solutions are good for canning figs.

Fig Jelly.—Preparation of fig jelly has also been an item for investigation. The method of preparation is as follows :—

Take three seers of ripe figs and cut them into small pieces and add water to these just sufficient to cover. Place the pot on the fire and boil for about 20 minutes. Take it off from the fire and add 5 ounces of lemon juice. When the lemon juice is added, the mixture assumes a fine pink colour. When sufficiently cool, press out the juice through a cloth and measure. Sugar should be added to the juice, volume for volume. This mixture of juice and sugar should now be boiled on a brisk fire, and stirred constantly so that sugar may not burn. It should be boiled for about 45 minutes. When it is moderately cool, pour it into glass containers of suitable size.

	Per cent.
The Poona figs contain	
Acidity (H_2SO_4)	0·23
Total Sugar (Glucose)	4·08
Pectin	0·55

Transport of Mango fruit.—Several packages of Alphonso mangoes were taken from Bombay on board the steamer on the 1st of June 1925 to Europe. Under normal atmospheric temperature, fruits remained in good condition as far as Naples.

MODIBAG, AGRICULTURAL COLLEGE

Manurial trials on fig.—With a view to find out the influence of various organic and inorganic manures on the quality and quantity of the crop, different manures are being tried for the last 3 years (1922-23 to 1924-25), in addition to the normal annual dose of farm yard manure.

The following table will show the qualitative tests and external appearance with regard to treatment :—

No.	Treatment	Sugar Per cent.	External or Market appearance
1	Super-phosphate	30·23	Fruits assumed deeper colour, shrivelled.
2	Ash	40·75	Light colour, shrivelled.
3	Dried fish	33·13	Fruits small, light colour, shrivelled.
4	Basic slag	34·82	Light coloured, ; less shrivelled and fruits cracked,

Improvement of Pomegranate by Breeding and Selection.—A large number of Dholka and Alandi seedlings have been raised. They show considerable variations as regards size of fruit, colour of juice, quantity and quality of seed, and bearing habit. These plants have been carefully compared with our existing types and good ones have been selected and propagated vegetatively. So far as qualitative improvement is concerned we can definitely state that improvement is possible.

Individual yield performance records of crops

Pomegranate.—Individual yield performance record of Dholka and Alandi varieties has been maintained for the last two years. The analysis of the yield record shows that Alandi type is more productive than Dholka, although the latter is better in quality.

Figs.—Individual tree performance records are maintained from 1923. The following are some of the details :—

Year	Total yield	Average yield per tree	Maximum yield of a tree	Minimum yield of a tree	Remarks
	Lbs. oz.	Lbs.	Lbs. oz.	Lbs. oz.	
1923-24	656 11½	5·33	15 12	0 6½	..
1924-25	1,220 3½	9·7	25 9	1 13	..
1925-26	1,590 8½	11·6	38 7½	0 7½	..

High yielding plants have been selected for further test.

Banana.—The individual performance record of the yield of stools has been very carefully preserved. Very little variation has been noticed as regards the quality of the fruit. As regards the quantitative factor, it was found that the correlation figures of yield record are all positive, and in some cases the relation of the probable error to the coefficient is very satisfactory. It is just possible that the quantitative factor may turn out to be inherited. This will be ascertained when the yield records of the second crop will be compared with the parent crop. At any rate, the ability of some stools to produce larger number of bunches as compared with the other, within the given time limit, is a very remarkable factor that has been observed in this connection.

Root exposure.—The roots of fruit plants, *viz.*, Santra, Guava, Mango, and Fig were exposed and pruned from time to time. It has been noticed that Citrus group gives the quickest response in the healing of wounds and formation of rootlets at the cut ends. In case of mango only the formation of callus is observed without the development of rootlets within the same period.

Introduction of new varieties of grapes.—The Baghdad varieties of grapes Des-elans and Ajami have borne fruit for the first time and are almost equal to the fruit they bear in Mesopotamia.

Ganeshkhind Botanical Gardens, Kirkee

Citrus Stock.—One important observation in our stock and scion trials, is the union of Santra grafted on kavat (Feronia Elephantum) which

takes place in about 50 days. As to their influence on one another, it is yet too early to come to any conclusion. A new plantation of stock plants of Feronia Elephantum, Ægle Marmalos, and Citrus trifoliata is already raised in plot No. 11, for further trials.

Die-Back of Citrus Plants.—Exhaustive observations are being recorded regarding the influence of different soils in causing this serious disease of citrus plants, and over their rate of growth. Experiments are also laid out to observe closely the effects on Santra plants of an impenetrable hard-pan at a short depth in the soil, and the alternative drought and water-logged conditions of soil that prevail in different parts of this Presidency.

Three fungi were identified by the Plant Pathologist on branches of Santra plants affected by Die-back. These are Gleosporium, Diplodium and Phoma. Healthy mosambi plants are inoculated by the same Gleosporium cultures with no effect in trying to induce the appearance of Die-back. Further trials are continued.

Banana Seedlings.—The banana seedlings of the Sonkel Chanda variety bore fruits with no seeds and little pulp. Suckers taken from these seedlings and planted separately bore better developed fruits with more pulp, and one of the suckers bore only a few seeds which were rudimentary and which, therefore, did not germinate. Second sucker crop has been raised in plot No. 13 for further observation. There is no striking vegetative variation in these banana plants. But so far as the number of fruits per bunch is concerned they differ.

Many more seedlings of Yella-bali, a South Indian variety of banana, are raised for observation. This variety produces seeds like Musa textilis and the plants are usually grown only for harvesting leaves.

The seedlings of Nendra-bali variety of banana have differed in having red colour on the lower surface of the leaves and red patches on the upper surface and do not bear inflorescence in this climate. Suckers of the same are sent to Bassein to see if they bear in that climate.

New plantations.—The following new plantations are laid out for observation :—

(1) Jambul grafts of good cultivated variety are planted in plot No. 3 in order to produce low bushy trees from which it will be convenient to pluck only ripe fruits, unlike the present tall trees.

Jambul budding is now found successful and by this means it is expected to take up top working of wild jambul trees with buds of the good variety.

(2) In the same plot, "transplanted" and "in situ" papaya plants are raised for comparative study of roots.

(3) A small plantation of Anona squamosa (sitaphal) plants is raised in plot No. 2.

(4) Part of plot No. 4 is planted with the Queen variety of Pine apple.

Crops under the shade of Mango tree.—Coffee and piper longum were grown under the shade of the mango trees out of which coffee is thriving very well, whereas piper longum has failed to grow.

Introduction of plants.—Large number of foreign varieties of grapes are introduced and recently planted in the grape orchards.

Advisory Work

As usual a large number of inquiries are being received from the public. A particular feature of this year was a regular campaign against the mango stem borer in the East Khandesh District, where people in villages took advantage of our help. In the year under report there was an abnormal demand from Gujarat, for expert advice and help in top working wild mango and bor trees, and as a result over 600 trees have been operated on.

We notice this year that there is considerable demand for young chiku trees but people are shy to purchase these on account of the high cost of nursery plants. Necessary arrangements are being made to meet this demand.

APPENDIX R

Summary of work done by the Inspector of Agricultural Schools, Bombay Presidency, for the year 1925-26

Staff.—Mr. K. M. Pawar, permanent Inspector of Agricultural Schools, held charge of the post during the year except for four months from November to February when he was on special duty, during which period Mr. R. Y. Hulkoti acted in his place. There were no special assistants to help in inspection work, but District Agricultural Overseers were made available to examine the bias classes.

Nature of work.—The nature of work as detailed in the last year's report has been purely advisory both in connection with the Vernacular agricultural schools and the agricultural bias classes attached to the primary schools. The objects of these two types of schools are, it will be remembered, quite different; while the agricultural bias classes aim at preparing the mind of boys for rural pursuits by adapting the primary school teaching to rural needs with little attempt at definitely teaching agriculture as such, the Vernacular Agricultural Schools definitely aim at preparing boys for taking up actual farming, and give a thorough grounding in all the important practical operations of immediate utility to the boys. As rightly expressed by the Director of Public Instruction in his note on Rural Education, the education imparted in the former may be called 'Education *for* agriculture' while that in the latter may be called 'education *in* agriculture.'

Vernacular Agricultural Schools

Number of schools and students admitted during the year.—There is one Vernacular Agricultural School in each of the Agricultural Divisions except Gujarat which has two. The total number of students, during the year under report at each of the different agricultural schools was as shown below;—Loni school 47, Devihosur 27, Dhulia school 29, Surat school 29 and Godhra school 34, and Jambhul school 25. The number of applications for admission in each of the schools has largely increased and attempts are being made in some of the schools to insist on personal interview and preliminary test before admission is given in order to secure the right sort of boys for the course. Attempts are also made to introduce the scholarship system instead of free boarding, the amount of scholarship being so fixed as to necessitate additional expenditure on the part of the boys of a rupee or two in order to test the student's earnestness for this type of education. It is very satisfactory to note that the introduction of the scholarship system which, it was very much feared, would be very strongly objected to by the boys then at the school, has been welcomed inasmuch as this system has enabled the boys to arrange their own boarding affairs with more freedom than was formerly the case, though under the occasional supervision of the staff members.

Curriculum.—During the year under report, the curriculum practically remained the same. But more attention was paid to the practical side of this tuition which though intended by the course laid down, has been neglected to some extent by some of the teachers. Gudar weaving with its adjunct, Rope-making, as a minor industry, is gaining popularity in almost all the schools and systematic arrangements to teach the subject are being made wherever possible. It is worth noting here that cultivators especially those in the Southern Division very much appreciate Gudar weaving, as it will add to their agricultural income which has now-a-days been very meagre and uncertain and which has of late necessitated some spare time engagement more keenly than before.

Inspection of schools.—The schools could not be visited as often as was desirable for the proper development of these schools. Loni and Jambhul schools being near, more attention could be paid to these schools only. The results of the annual examination of the various schools show that the general calibre of boys admitted is low and the examiners recommend higher educational qualification and preliminary test before admission wherever possible. In the case of Surat, Dhulia and Loni schools, boys have done fairly well, while in the case of Godhra, Jambhul and Devihosur schools, the boys have not done so very satisfactorily, probably due to the temporary change in the personnel of the Head-masters of these schools and other local disturbances, *e.g.*, plague at Devihosur.

Agricultural bias classes

Number of classes and attendance.—There are now 42 agricultural classes in the Presidency including Sind and the average number of such classes per District comes to two for the present to which one is generally added every year and each of these classes involve an initial expenditure of Rs. 200 for farm tools and apparatus and Rs. 200 for workshop tools and a recurring expenditure of Rs. 350 for each class besides requiring land and water for garden purposes. Arrangements for adequate grant and facilities for gardening are necessary before opening of such classes. The attendance at these classes is fairly large and regular, except in a very few cases in which the localities selected are not so well suited for the purpose.

The work of the classes.—All these classes have been working fairly well and have become popular in rural areas for which they are intended. The students show interest for practical work, which is as it were a recreation to them, especially so, when the agricultural teacher tactfully arranges his field lessons and actually works with them. The annual examination results of these classes in so far as they relate to technical subjects show good progress in the case of almost all schools.. In some cases, the classes have been able to do more than what was expected of them. Though the object of these classes is to prepare the minds of boys for rural pursuits by adapting the teaching to rural environment, the illiterate cultivators expect of these classes what they really ought to expect from the agricultural schools of the type of the Loni school.

They cannot quite differentiate between the objects of these two different types of schools. It has therefore been difficult for the agricultural teachers of bias classes with limited agricultural knowledge to reconcile the genuine object aimed at and the expectations of the cultivators. When considered from a practical point of view it will be necessary to teach something more than what is aimed at, in order to keep the cultivators satisfied as the very recruitment of boys for these classes depends on the impressions which these cultivators will have about our agricultural bias classes.

Inspection.—The inspection of these classes could not be regularly undertaken owing to the scattered nature of these classes throughout the Presidency and the limited amount of grant when compared with the nature of work. Even the examination of these classes had to be entrusted to the District Agricultural staff, many of whom had to first make themselves acquainted with the nature of the work carried on in these classes and the capacity of boys for agricultural instruction. The reports of these officers show that majority of these classes have done very good work and the teachers deserve credit for their work. The four pioneer schools first established, sent their boys for the First Vernacular Agricultural Final Examination and the result is as shown below :—

Name of school	Number of boys sent	Number passed
Asoda (East Khandesh) ..	16	12
Deolali (Ahmednagar) ..	5	4
Peth (Satara) ..	12	7
Kognolli (Belgaum) ..	12	7
	45	30

The boys that have passed in this examination have been anxiously waiting for admission into the training institution arrangements for which are, it is hoped, being made by the Educational authorities in consultation with the Director of Agriculture.

General.—Though the actual number of agricultural bias classes to be visited is not great, the scattered nature of these schools throughout the Presidency does not admit of sufficient visits nor can attention be concentrated on the development of a particular type of school in a particular area. Again there comes the question of budget grant which being limited does not allow of frequent visits. The Inspector is, as it were, oscillating from the Northernmost to the Southernmost corner of the Presidency with no proper development of work to show at the end of the year. It would be better if the Inspector is given some Vernacular agricultural assistants to help him in guiding the agricultural teachers in agricultural bias classes in which case, the Inspector can devote greater attention to the development of the more important institutions, *viz.*, agricultural schools for which the post of Inspector was originally created.

There has been a demand from various District Local Boards to increase the number of agricultural schools of the type of Loni School. The Kaira Local Board wishes to have one at Nadiad. Ahmednagar has almost settled to have one at Savalvihir, near Kopergaon, though the matter of land is still under discussion with Government. The Belgaum District Local Board wishes to have one at *Arbhavi* and has offered to meet the expenditure in the proportion of $\frac{1}{3}$ of the Board to $\frac{2}{3}$ by Government. So also the Bijapur District Local Board has approached the Agricultural Department saying that a local gentleman at Kakhadaki has generously offered a sum of Rs. 14,000 for the opening of an agricultural school there and that the local people are willing to help with some land for school and the Board will try to contribute every year some money towards the recurring expenses of the proposed school. These offers show that there is a genuine demand from the public for this type of education and this I think, is a very favourable opportunity to develop these schools. When once local enthusiasm is suppressed, the opportunity to develop these schools is lost and the cultivating public will have to suffer the disadvantages.

Programme of future work.—Future line of work will consist in developing both the agricultural schools and the agricultural bias classes. The development of both these types of schools will very largely depend on the local enthusiasm and pecuniary support of the local Bodies. These being vocational schools in nature are bound to be more costly than the literary institutions in rural areas. But considered from their practical effect on the rural public they more than repay the expenses incurred. This will necessitate more propaganda and the members of both Taluka and District Local Boards and of Municipalities will have to be approached and the necessity of these schools brought to their notice. As such matters can only be arranged through some local influential gentlemen, it may be necessary to offer them some encouragement before we can enlist their sympathy and get their aid in fulfilling our object. It is suggested that the appointment of honorary rural school organisers, say one for each District to start with, will help us in properly organising and developing our new system of rural school education.

Another line of work in developing these schools is to undertake systematic inspection of the work of past students. The cultivators judge the utility of our agricultural schools from the work done by the past students who have undertaken farming. As it is likely that these students will meet with innumerable difficulties and as they are inexperienced, some of the village people are likely to discourage them at the outset. Occasional visits of the Inspector to the students' farms and bringing to the notice of the Revenue officers the work of these students and recommending them for giving preference in respect of grant of Tagai or Boring machines, Government waste land or the like, would go a great way in popularising the work of our schools. Though the District agricultural staff is expected to attend to these boys, it has in practice been found not feasible owing probably to their own difficulties. In order to relieve the Inspector for this work, it is necessary that the work of bias schools

should be reduced to a minimum by the appointment of graduate or Vernacular assistants to assist the Inspector in this work, their pay and T. A. being met from the Educational Department.

Another matter of importance is the writing of leaflets or books suitable for agricultural schools. The appointment of Graduate or Vernacular assistants will help the Inspector to undertake this work as far as possible.

R. Y. HULKOTI,
Ag. Inspector of Agricultural Schools.

APPENDIX S

ANNUAL REPORT OF THE WORK OF THE LAND DEVELOPMENT FOR THE YEAR 1925-26 (YEAR ENDING 30th JUNE 1926)

During the year under report 48 new cases were received for investigation. Their distribution by districts is as follows :—

Poona 17, Sholapur 14, Ahmednagar 2, Satara 1, Nasik 4, Ratnagiri 2, Belgaum 1 and Dharwar 7.

The classification of these schemes from an engineering point of view is as under :—

	Schemes
(*a*) Diverting streams by putting dams across nalas or rivers for irrigation purposes	14
(*b*) Storing water by putting dams across nalas or rivers for irrigation purposes	3
(*c*) Percolation tanks (storing water by means of dams and allowing it to percolate through the sub-soil into the wells below)	11
(*d*) Field embankments (Providing tals and waste weirs)	13
(*e*) Repairing tanks for irrigation purposes ..	2
(*f*) Diverting nalas to protect and develop agricultural lands	4
(*g*) Design for a well for mohote	1

Progress of work.—Thirty schemes (24 of this year and 6 of last year) were completely investigated, surveyed and the papers concerning the same were finally disposed. They cover an area of about 1,400 acres. Six schemes (2 of this year and 4 of last year) were surveyed with fly levels and reports on the rough costs of schemes and the probable area that will be developed, are submitted for the information of the applicants concerned. These schemes cover in all an area of about 2,000 acres. In addition to the above, sites of 21 schemes (12 of this year and 9 of last year) were visited by the Land Development Officer to find out whether the schemes suggested are feasible and fit for making preliminary survey.

The present report is the second and the last of its kind. The conditions under which the appointment of the Land Development Officer was made, do not exist now. An officer of the rank of Superintending Engineer has been appointed by Government Resolution No. 4142/24 of 24th August 1925, to investigate the schemes for minor irrigation works. His duties include many of those of the Land Development Officer, and hence the retention of two officers doing he same kind of work is found unnecessary. It is, therefore, decided by Government Resolution No. 6275/24, dated 21st June 1926, to abolish the post of the Land Development Officer and to appoint two Agricultural Graduate Assistants for work in districts not included in the range of the area under the Superintending Engineer on special duty for minor irrigation works.

N. C. BAPAT,

Poona, 10th August 1926. Land Development Officer.

APPENDIX T

The following is a brief report on the progress of Agricultural propaganda work in Sind for the year ending 31st March 1926.

Under Government order No. 5805, dated 6th April 1925 the period of my special appointment as Agricultural Propaganda Officer was extended to one year more, *i.e.*, up to 31st March 1926, and I remained in charge of the work throughout the year in addition to my own duties as Assistant Registrar, Co-operative Societies in Sind.

Area of operations

The area of operations continued to be the same 8 Talúkas, *viz.*, 1. Hyderabad, 2. Halla, 3. Tando Allahyar, 4. Shahdadpur (Middle Sind), 5. Larkana, 6. Kambar, 7. Sukkur, 8. Ghotki (Upper Sind) till August 1925, when in the Divisional Board's meeting of 22nd August 1925, three more Talukas, *viz.*, 1. Shikarpur, 2. Mirpur Mathelo, 3. Dero Mohabat were also annexed to my jurisdiction bringing the total number to 11 Talukas.

Propaganda Staff

No change was effected in the numerical strength of the staff though the Inspector of North Sind was incapacitated on account of an accident and had to remain on sick leave for over 5 months. No substitute was appointed in his place and the work was carried on by the District Agricultural Overseer as in Middle Sind.

Season

The innundation last year was not favourable throughout, with the result that there is a cry of general failure of crops all round owing to drought. The prices also, specially of cotton, did not rule favourably and hence the agriculturists on the whole have not to record a happy or a prosperous year.

Owing to intensive propaganda work both in the spheres of co-operation and agriculture a distinct change for the better is now visible in a good many developed tracts of the Province amongst the agricultural masses. Until very recently they were known to be debt-ridden, thriftless people toiling on their lands with their old types of implements sowing nought but the rotten seeds purchased on loan from the banias, realizing but a pittance from their cultivation but now they have shaken off their apathy and are beginning to lead a better mode of existence. Co-operative societies provide them with cheap credit wherewith their emanicipation from the clutches of the money lenders has been greatly effected. Through the agency of societies they have also acquired to some extent the habit of thrift and self-help.

Having acquired credit facilities, the agriculturists purchase seeds to their choice and can also afford to go in for implements approved by the Agricultural Department. In methods of farming also they have left off their primitive ways and are betaking themselves to modern ones. The dry ploughing system among other methods is greatly appreciated

all round and adopted far and wide with excellent results. Signs of these improvements were witnessed by Dr. Mann, Director of Agriculture also, and in the course of a lecture delivered recently to the educated public of Hyderabad Sind he remarked that he had been greatly surprized at the agricultural progress made by the members of a group of 17 societies within a radius of 10 miles of Hyderabad which he had had an occasion to visit that morning. Five years back the members told Dr. Mann their average crop of cotton was 5 maunds per acre which has now increased to nearly 20 maunds, and in some cases the record was even 25 maunds per acre. Their statements he said were corroborated by the general good condition of their lands and their decent appearance. He was curious to know the cause of their improvement which they attributed to dry ploughing in winter, the use of Egyptian and Monsoon plough, select seed and judicious manuring. These were factors known to the agriculturists all along but they did not work so hard on their soil for they always felt that whatever be the produce they could not aspire to anything but a bare maintenance as the rest must all go to repay their debts to the Sowkars. With that gloomy prospect they put no heart in their work. The cheap Co-operative credit had relieved them of the heavy load of interest and they now felt that they could possess what they produced. This confidence had stimulated them to earnest effort of which the result was apparent in the fertility of their crops and their decent appearance.

This refers to a group of societies in Hyderabad Taluka alone but in other places also in the propaganda area where the societies have been well established, this improvement is markedly visible. In Larkana District, which is the most advanced district, both from the standpoint of co-operation and agriculture, the agriculturists having realized the benefits of improved implements and methods, are now trying themselves to effect some improvements in the plough, screw lift, rice cultivation, etc., to suit their local requirements. They have trained their own carpenters to manufacture the Egyptian plough and also the screw lift with bullock gear arrangement, etc.

Summary of Progress

The programme of Agricultural propaganda work was as usual confined to

1. The popularization of improved seeds.
2. Do. implements.
3. Do. modern methods of farming.
4. Development of Taluka Agricultural Associations.

Popularization and distribution of seeds

(a) Pusa 12 wheat

Four hundred maunds of Pusa 12 wheat were purchased from the Jacobabad Wheat Farm and 786 maunds from the District through the agency of the two seed societies of Sukkur and Ghotki. The whole quantity of 1,186 maunds was distributed in the four intensively cultivated

Talukas of Upper Sind. This wheat is being multiplied automatically also. Approximate figures for the last 3 years under Pusa 12 may be recorded as under :—

1923-24	..	..	.. 5,000 acres
1924-25	..	..	.. 14,000 ,,
1925-26	..	..	.. 15,000 ,,

The area under Pusa 12 might have been still greater in 1925-26, but owing to failure of inundation last kharif there was no adequate degree of sub-soil moisture to help the wheat to grow. The poor yield of last year's wheat crop due to unusually severe frost is another factor to account for the comparatively smaller expansion of the area under Pusa 12. This variety of wheat commands the greatest appreciation in tracts where there is ample sub-soil moisture. It does not appear to thrive so well in poorer soils or where there is not enough of under-ground moisture. For this type of land a new variety called Phandni has been found to be the most suitable. About 25 maunds of Phandni had been distributed last rabi season for experiment, which has proved very successful. The zamindars have expressed their satisfaction regarding the success of Phandni under Bosi conditions. It is hoped next cold weather that a greater quantity of Phandni will be distributed in the propaganda area in addition to Pusa 12 and that there will be only two main classes of wheat grown in the propaganda area, *viz.*, Pusa 12 in moist lands and Phandni in Bosi.

27 W. N. Cotton

The Agricultural Department gave 400 maunds of this variety for distribution in the Intensive Propaganda area for the Kharif of 1925 of which 350 maunds were given to selected growers in the Hyderabad Taluka for multiplication purposes and the remaining 50 maunds to Tando Allahyar Taluka. The seed sown was inspected by the Inspector and Overseer from time to time and its progress watched. At harvest time the N. R. Phutties were picked and stored separately. Special arrangement was made with a ginning factory to gin these phutties also separately under supervision of the Agricultural Organizer, Inspector and the Honorary Organizer. The seed from such selected phutties was thus of the purest quality and about 1,600 maunds thereof were secured by the Hyderabad Taluka Development Association which have just been issued for further multiplication in addition to 1,000 maunds obtained from the Agricultural Department. On account of the higher ginning percentage the N. R. Phutties commanded 0-12-0 premium in the market over the average price and have met with great appreciation.

Bhitshah Cotton Seed

The next best variety of cotton seed, *viz.*, the Bhitshah seed was also distributed through the agency of respective Taluka Development Associations as under : —

Hyderabad Taluka	..	..	.. 2,000 maunds
Tando Allahyar	..	..	.. 500 ,,

Shahdadpur	..	..	..	255 maunds
Halla	..	..	..	350 ,,

The seed as usual is appreciated by the zamindars and the factor owners also have expressed much satisfaction at the better stuff that is now being sold to them.

Paddy seeds

Two varieties of Paddy seeds, *viz.*, Jajai and Prong have just been recommended by the Agricultural Department. A good quantity thereof was distributed among some of the members of co-operative societies, but the seeds will formally be distributed through the Taluka Associations from next year for multiplication.

Berseem seed

Thirteen maunds of this seed were obtained through the Deputy Director which were distributed among zamindars of Hyderabad Taluka on cash delivery system.

Implements

The following implements were disposed of during the year by the various Taluka Development Associations apart from those obtained by the agriculturists direct from the manufacturers or the market :—

				No. sold
Sirkar plough	..	..	..	413
Monsoon plough	..	..	..	14
Meston plough	..	..	..	40
Rajah plough	..	..	..	4
Chatoonga	..	..	..	4
Scrapers	..	..	..	4
Screw lifts	..	..	..	290

From the above table it will be observed that the Egyptian plough and Screw lift have acquired the greatest popularity. In every centre of agricultural activities local carpenters have been trained to manufacture the Egyptian plough and in fact the plough has so well been advertised and appreciated that there is no need for any additional propaganda for this implement in the propaganda area. In my previous reports I have remarked that the Egyptian plough is not quite suitable for very hard soil and the Director has recommended the Meston plough for them and steps are being taken to introduce it on a large scale.

As regards the Screw lift, the Agricultural Inspector North Sind says that he had already prepared the ground for carrying on demonstrations from the commencement of the last kharif. When there was premature fall of water by the 20th of August 1925 there grew a considerable rush upon the screws. The two carpenters who so to say had the monopoly of manufacturing these screws went on raising its price from Rs. 35 to Rs. 50. Besides they used somewhat inferior material. The demand was indeed so pressing that though about a dozen carpenters had been engaged to prepare them day and night they could not cope with it. This accounts for the sale of about 225 screws in the month of September alone. If more screws had been available in stock the sale would have been

very much greater indeed. The Lift has gained much popularity even in talukas outside the propaganda area, *e.g.*, Ratodero, Mirokhan, Dokri, Warrah, Mehar, Dadu, Sehwan and even the Upper Sind Frontier District. The amount of popularity of this Lift could further be gauged from the fact that several zamindars after filling their own paddy beds with water, rented the Lift to their neighbours and realized its cost from rent alone.

One prominent zamindar of Larkana remarks that " If the Agricultural Department have at all invented any magical implement it is the Archmedean Screw Lift. " To form a correct idea about the utility of this Lift, the following calculation would be found interesting :—

Each Lift was used at least 15 days during the last innundation and filling as it does 4 jirebs a day, each Lift must have filled (15×4)=60 jirebs of rice lands. Dividing this figure by 2, as each plot must have been watered twice, we could say that each Lift has irrigated 30 jirebs. The plots irrigated by the Screw Lift yielded 8 maunds per jireb while those on ordinary mok 4 maunds per jireb, *i.e.*, each Hurla saved 4 maunds of paddy per jireb, *i.e.*, in all (30×4)=120 maunds in the 30 jirebs irrigated by it. Calculating the price of paddy at Rs. 4 per maund the saving effected by each Hurla is (120×4)=Rs. 480. Multiplying this by the number of Lifts sold, *viz.*, 290 the total saving effected works at Rs. (290×480)=Rs. 1,39,200. The above calculation vividly shows the amount of saving the Screw Lifts have been able to make in one season only.

After the last kharif season was over the consensus of public opinion about the Screw Lift appeared to be, that though the implement was a God-sent gift, it would be far more preferable, if instead of manual power the Lift could be worked by bullock power. The price of a Screw Lift fitted with bullock geer quoted by the Mirpurkhas Farm was a prohibitive price of Rs. 400 and hence the Agricultural Inspector says that arrangements are being made to attach a cheap, simple wheel to the Lift and make it workable by a bullock. The cost of this will be very much less than that quoted by the Mirpurkhas Farm (about Rs. 60 to 80). The arrangement is however under experiment and results have yet to be watched.

Methods of farming

Drill system.—To prove to the agriculturists the efficiency of the Drill System of cotton cultivation 9 plots measuring 30 acres were secured in different Talukas as under : —

		Acres
Taluka Hyderabad	2 plots	18–20
Taluka Tando Allahyar ..	3 „	6–0
Taluka Shahdadpur	2 „	2–0
Taluka Halla	2 „	3–20
	9	30–0

They were sown on the Drill method under personal supervision of the Agricultural Inspector. Weeding was done by the plough and demonstrated to the neighbouring zamindars with very satisfactory results. Mr. Jagtiani, M. A. and Hashim Shah eminent zamindars of Hyderabad Taluka have furnished certificates eloquently speaking of the success of this system of cotton cultivation. Apart from the saving effected in expenses, time and trouble ordinarily spent on hœing, opinion has been confirmed that the rate of growth also of Drilled cotton is much quicker and vigorous than that of cotton sown under ordinary conditions. The system however works better on flow lands.

Demonstrations and Dry ploughing

To demonstrate to the people the superiority of our ploughs the Kamgars of Associations visited about 500 villages and held demonstrations. Ploughing was done partly free and partly on rent About 200 acres in all were ploughed on rent and the amount realized. (Rs. 340) was duly credited to the accounts of the Taluka Development Associations concerned. These demonstrations have also the simultaneous advantage of showing to the agriculturists the benefit of dry ploughing which is now being practised very largely within and without the propaganda area.

Improvements in rice cultivation

Enough has been said in my previous reports about reduction of seed rate in rice cultivation and earlier transplantation of seedlings in the propaganda area. Suffice it, therefore, to say now that the methods have been universally accepted and adopted and further propaganda in this behalf is not needed. The experience of last year has been a great eye-opener to the agriculturists. They have seen and realized that the lands which were dry ploughed and which were transplanted earlier yielded abundantly, while those not similarly dealt with yielded comparatively little.

Crop pests

There was a heavy attack of rust on rice for the first time in the history of this crop in the Larkana District; Samples of diseased plants were given to the Director of Agriculture who is trying to find a remedy. No disease was reported in cotton crops though Bokharo and Boll worm were reported to have done some damage in scattered areas.

Taluka Development Associations

In addition to the eight associations pertaining one to each of the eight Talukas of the propaganda area, three more have just been organized, one in each of the new Talukas annexed to the propaganda area, *viz.*, Shikarpur, Matli and Mirpur Mathelo, bringing the total number to eleven. While the last three institutions are yet new organizations and will commence their operations in full swing this year, the old eight continued to work satisfactorily and all the activities detailed in this report were mainly carried on through their agency under the guidance

and supervision of the Agricultural staff. Each Association maintains a paid Supervisor and Kamgar. The former inspects and organizes co-operative societies and carries on agricultural propaganda to some extent, while the latter carries on demonstrations of implements, etc. The Associations also maintain their Implement Depôts wherefrom implements are issued both on hire and sale.

The Kambar Taluka Development Association had organized in January last a grand agricultural and co-operative exhibition under the presidency of Mr. P. R. Cadell, Commissioner in Sind, wherein best varieties of paddy seeds and agricultural implements were exhibited. There were in all 62 exhibitors 16 of whom were awarded prizes and certificates by the Commissioner. More than two thousand agriculturists of the Larkana District attended the exhibition and they were greatly struck by the implements and methods of cultivation suggested.

At Gosirji, Matli and Junejo also central agricultural demonstrations had been organized under the auspices of the Sukkur Matli and Hyderabad Taluka Development Associations respectively. They were very largely attended and greatly appreciated.

The Hyderabad Association rendered very valuable service to the agriculturists of the Taluka last kharif season. Owing to sudden and early fall of the river the Karias had ceased to flow and hence the Association sent down a deputation to wait upon the Irrigation authorities with the result that water was made available to zamindars for full 15 days by rotation. This materially saved the crops of Hyderabad Taluka.

Fruit seedlings

The Sukkur and Larkana Taluka Development Associations are very keen upon mango grafting and orange planting experiments. They sent for 20 Alphonso mangoes and 21 orange plants from Mirpurkhas Farm and distributed them among some of the selected growers of the Talukas.

The orange plants took root all round while some of the mango plants have not done well. The Superintendent of the Mirpurkhas Farm attributed this to the hot climate of Upper Sind in March and April and therefore suggested the other season of planting, *viz.*, October as an experimental measure. During October therefore a Mali was sent for from Mirpurkhas Farm and the mangoes grafted as under : —

Larkana	20
Ghotki	16
Shikarpur	7

There was still much work for the Mali to do in Shikarpur and Sukkur Talukas, but the cold season having set in the Zamindars and the Mali were of opinion that the mangoes will not take root. Further grafting work had therefore to be suspended and will be resumed this year.

The Tando Allahyar Taluka Development Association had resolved this year to send its own men for seats in the Taluka and District Local Boards. In accordance with this resolution the Association did send the names of its own representatives who were elected without opposition.

Miscellaneous

During the year Dr. Mann, Director of Agriculture visited Sind twice and inspected by turns all the Taluka Development Associations except Shahdadpur. At each place he met several zamindars and personally witnessed the progress made by the Associations. Mr. Madan, I.C.S., Registrar of Co-operative Societies and the Honourable Mr. Dehlavi, Minister of Co-operation and Agriculture also visited Sind last January. and among other Co-operative Institutions they saw the various Taluka Development Associations and inspected their work.

It is hoped that vigorous efforts will be made to carry on intensive propaganda in the three new Talukas assigned to me in the same manner as in the other eight Talukas.

I have the honour to be,
Sir,
Your most obedient servant,
AZIMKHAN,
Assistant Registrar,
Co-operative Societies in Sind.

APPENDIX U

Summary of the work done by the Professor of Agricultural Economics during the year 1925-26

The post of the Professor of Agricultural Economics was created by Government under Government Resolution No. 2602/24 dated 9th May 1925 (Revenue Department), and I am holding it from 4th June 1925.

A Graduate Assistant under training Mr. T. G. Shirname, B.Ag. was given from 8th June 1925.

A post of a Demonstrator in Agricultural Economics has been newly sanctioned and Mr. T. G. Shirname has been allowed to hold the same from 10th June 1926. Mr. T. B. Pawar, B.Ag. relieved Mr. Shirname.

Lines of work

The work of this section can be divided into three main branches, *viz.*, (1) Teaching, (2) Investigation, (3) collecting information from various quarters of the Presidency bearing on Agricultural Economics.

(*1*) *Teaching*

This being the first year of the new course the Senior B.Ag. class had to be given Elementary Economics, Agricultural Economics and marketing in the same year. The juniors were given few introductory lectures. There were 20 students in the senior B.Ag. out of the total 39 who had taken Agricultural Economics as their optional and in the junior B.Ag. there were 52 students. I also gave lectures on co-operative marketing to the supervisors class for about ten days.

Mr. S. K. Ghorpade, B.Ag. Graduate in training of the Loni Agricultural School was specially deputed by the Deputy Director of Agriculture, S. C. D. to attend lectures in my subject. He was examined at the end of the year and he passed. Mr. Shirname attended all lectures of the senior B.Ag.

(*2*). *Investigation*

The section being in its early infancy, it has not yet got an adequate staff under me to carry out exhaustive investigation. The Graduate Assistant is entrusted with the cost of production work. Nanded, Pimple (Sathyache), Wagholi, Loni kalbhor, Sahajpurwadi, Bori Aindi and Bori Bhadak are selected for this study and by regular weekly visits he obtains data on the cost of production of few staple crops from selected cultivators. It was found difficult, though not impossible, to secure figures in the beginning due to the characteristic natural, conservative and suspicious character of the cultivators. But once convinced and their doubts removed they have been found to be very cordial and ready to give information. Most of them do not keep records and to get real data more frequent visits are necessary, though for want of sufficient T. A. grant the visits had to be restricted to once a week and to some places at greater intervals. The figures for one year are complete. It is however very necessary to continue this work with the same farmers at least for two more years to get better average since in Agriculture seasonal variation

makes considerable differences in outturns and labour incomes. The experience gathered and the figures collected show that though the labour-income is not sufficient, due to the management (or grades amongst the farmers) some make more labour-income than others and if more of such data be collected, organized and interpreted it is possible for the Department to make useful suggestions to the farmers, regarding raising and marketing crops as also in the adjustment of other factors such as capital (required for manure, etc.) and labour.

Great deal of variation is found in the expenditure for manure and labour and very few of the farmers try to adjust the expenditure of their capital and labour to their expected returns. If the farmer some time (after he gets education) keeps accounts he will probably think more in terms of business.

Another investigation work is in the cost of production of sugarcane at Sarood and Wadgaon in the Warna River Valley. A temporary man has been appointed and he is asked to collect figures on costs. The work has been begun from November 1925 when new cane was planted. This work is expected to give very interesting information. The man is on the spot all the time and his record is very complete and accurate. As an instance the following information (though obtained by the man before he was appointed) shows how a little slackness affects gross outturns and profits.

Since water has to be lifted by series of four or five lifts some cultivators harvest cane soon after the monsoon, while others give one or two waterings and then harvest. The following shows the difference due mainly to the two waterings as otherwise there was not much difference in other items.

——	Area	Total Outturns in lbs.	Outturn per acre
	A. g.		
Sugarcane receiving two waterings before crushing ..	8 31	48,758	5,559
Sugarcane which did not get water	5 26	20,215	3,578

(3) *Collecting information*

Serious attempt is being made to find out the seasonal feeding of some of the cotton, groundnut and gul markets and its effect upon the prices realized by the producers. The object is to find out corelation between prices and quantities offered for sale. Since this kind of work depends more on the goodwill of the outside people a rapid progress in this line is not possible. Many of the big merchants and dalals in different marketing centres were approached and requested to supply information but they seem to be very conservative with some exceptions. Even public local bodies like municipalities have not rendered much assistance.

All the same we received good response from some municipalities like Poona, Nagar, Sholapur, Dhulia, Baramati, Kolhapur and some few others.

Much of the information bearing on Agricultural Economics is to be obtained from District Officers of the Department, and though all have tried their best to furnish information as far as they can, it has been found that the subject being a new one it takes a very long time before the correct and desired information is obtained ; the work will be continued.

Publications

I had already written, while I was Deputy Director of Agriculture, S. C. D. in co-operation with Mr. V. G. Patwardhan of the Manjri Farm, and submitted a bulletin on some of the promising varieties of sugarcane. The bulletin is in the press. I have taken in hand about four bulletins on sugarcane industry. Two of them are nearly completed and will be submitted within a short time after checking figures and making certain minor additions.

Agricultural College,
Poona, 14th July 1926.

P. C. PATIL,
Professor of Agricultural Economics.

BOMBAY : PRINTED AT THE GOVERNMENT CENTRAL PRESS.

List of Agricultural Bulletins published by the Department of Agriculture and kept for Sale at the Government Book Depot, Bombay

No.	Year	*Subject*	Price Rs. a. p.
32	1908	Locusts in India, by H. M. Lefroy, Imperial Entomologist, Pusa	0 8 0
33	1909	Cultivation of Broach Cotton in Dharwar, by M. L. Kulkarni, Divisional Inspector of Agriculture, S. D.	0 4 0
		,, ,, ,, (Kanarese) ..	0 4 0
34	1909	Night-soil—A Valuable Manure, by G. K. Kelkar, Assistant Professor of Agriculture, Agricultural College, Poona ..	0 4 0
35	1909	Kalar in Sind, by G. S. Henderson, Deputy Director of Agriculture, Sind	0 4 0
36	1910	First Experiments in the Treatment of Grape Vine Mildew in the Bombay Presidency, by W. Burns, Economic Botanist ..	0 14 0
37	1910	An Examination of the Seed-Supply of the Broach District, by G. D. Mehta	0 4 0
39	1910	The Salt Lands of the Nira Valley, by Harold H. Mann, Principal, Agricultural College, Poona, and V. A. Tamhane, Laboratory Assistant, Agricultural College, Poona	0 5 0
40	1911	The Cultivation of Guavas near Poona, Dharwar and Limbgaon.	0 12 0
41	1911	Groundnuts in the Bombay Deccan	0 4 0
43	1911	An Examination of the Seed-Supply of the Broach District, Part II	0 5 0
44	1911	Preliminary Study of the Red Rot of Sugarcane in the Bombay Presidency	0 8 0
45	1911	Second Year's Experiments in the Treatment of Grape-Vine Mildew in the Bombay Presidency	0 14 0
46	1911	Seed Selection Series I, Broach Cotton	0 8 0
47	1911	San Hemp	0 4 0
48	1911	Poona Furnace	0 7 0
		,, (Marathi)	0 6 0
49	1911	An Examination of the Seed-Supply of the Ahmednagar District, Part I	0 5 0
50	1912	An Examination of the Seed-Supply of the Ahmednagar District, Part II	0 3 0
51	1912	Third Year's Experiments in the Treatment of Grape-Vine Mildew	0 3 0
52	1912	Muscovado Sugar Machinery and its scope for Gul Manufacture in India	0 8 0
53	1912	A Method of improving the Quality of Cotton Seed	0 7 0
55	1913	An Examination of the Seed-Supply of the Poona District ..	0 3 0
57	1913	Improvement of the Indigenous Plough of Western India ..	0 12 0
59	1914	Common Salt and its use as Manure in the Konkan Division ..	0 3 0
62	1914	The Value of Castration of Deccan Bullocks	0 3 0
63	1914	Substitutes for Rab	0 3 0
64	1914	Alkali or Kalar Experiments and Completion Report of Daulatpur Reclamation Station in Sind	0 14 0
65	1914	A List of Diseases of Economic Plants occurring in the Bombay Presidency	0 4 0
67	1914	An Examination of the Seed-Supply of the Sholapur District ..	0 3 0
69	1915	The Rice Stem Borer in the Konkan	0 3 6
70	1915	Improvement of Cotton in the Bombay Presidency (except Sind)	0 3 6
74	1915	Well Waters from the Trap Area of Western India	0 6 0
78	1916	Some Wild Fodder Plants of the Bombay Presidency ..	0 13 0
79	1916	The Cultivation of Guavas in Gujarat	0 5 6
80	1916	List of Seeds available on the Agricultural College Farm, Poona .	0 5 3

No.	Year	Subject	Price Rs. a. p.
81	1916	Note on Fencing Construction	0 6 9
82	1916	Cultivation of drilled paddy in South Bombay Presidency ..	0 8 0
83	1917	The Spice Gardens of Sirsi in Kanara	0 10 6
84	1917	Seed Selection Series—Kumpta Cotton	0 1 0
85	1917	Note on Cattle in the Bombay Presidency	0 11 0
86	1917	Establishment and Management of the Dairy Farm ..	0 7 0
87	1918	The Utilisation of Inferior Grass Herbage, Experiments at the Tegur Cattle Farm	0 9 0
88	1918	First Report on Fruit Culture as practised round about Tharushah (Sind) in Nawabshah District	0 2 0
89	1918	Artificial Manures : Experiments on their value for crops in Western India	0 3 3
90	1918	Work on the Manjri Farm for the years 1915-18	0 7 3
91	1919	The Cultivation of Berseem in Sind—Experiments at Sukkur ..	0 1 0
92	1919	Classification and Description of the Jowars of the Bombay Karnatak	0 10 3
93	1919	Palm Gul Manufacture in the Bombay Presidency (Principally Date Palm)	1 3 9
94	1919	The Sugarcane Borer and its Control	0 4 3
95	1919	The Cultivation of Oranges and Allied Fruits in the Bombay Presidency	0 2 6
96	1920	Investigations into the nature of the Salt Lands of Sind ..	0 12 0
97	1920	Prickly-Pear as a Cattle Food	1 4 0
98	1920	Fruit Culture as practised near Shikarpur, Sind	0 1 6
99	1920	Rice Cultivation in the Larkana District, Sind	0 8 0
100	1920	Fodder Crops of Western India	2 1 0
101	1920	Fruit Culture in Palitana and Jamnagar	0 8 6
102	1920	Investigations on Potato Cultivation in Western India ..	1 15 0
103	1920	The Book of the Mango	3 5 0
		,, ,, (Marathi).	
104	1920	The Ganeshkhind Botanical Garden, Kirkee (Its Genesis and Development)	0 15 6
105	1920	The Groundnut Bug and its Control	0 2 0
106	1920	Dharwar American Cotton : Its History, Cultivation and Improvement	0 7 0
107	1921	Gonag—a weed in drilled paddy	0 5 0
108	1921	Summary of the Work done on Jalgaon Farm	0 5 6
		,, ,, ,, ,, (Marathi).	
109	1921	The Crops of the Bombay Presidency—their Geography and Statistics	2 13 0
110	1922	Year Book of the Agricultural Department in the Southern Division	0 5 0
111	1923	A Note on Well Boring	0 8 0
112	1923	Improvement of Grazing Areas in the Bombay Presidency ..	0 11 6
113	1923	Year Book of the Agricultural Department in Sind Division ..	
114	1923	Studies on the Rice Plant and on Rice Cultivation	
115	1924	Shevri as a Fodder Crop	0 3 0
116	1924	Sugar Industry in Western India and methods of Sugar Manufacture	1 2 0
117	1924	Investigations in Fig Culture and Treatment	0 5 6
118	1924	Land Crabs as Agricultural Pests in Western India ..	0 8 0
119	1924	Year Book of the Agricultural Department in Southern Division, 1924	0 4 6
120	1924	Silage for Fodder in Western India	0 4 0
121	1924	Further Investigation on Potato	0 6 0
72	(Revised 1925)	Experiments with the Automatic Water Finder in the Trap Region of Western India	0 4 0
122	1925	Sugarcane Varieties of Bombay Presidency, India	0 2 6
123	1925	Ridge Cultivation in Lower Gujarat	0 8 0
124	1925	The Chemical Composition of Food-grain Vegetables and Fruits of Western India	0 3 6
125	1925	Some of the promising exotic Sugarcane Varieties of the Manjri Farm	0 13 0
126	1925	The Bhagnari Breed of Cattle in Sind and Baluchistan ..	0 6 0

No.	Year	Subject	Price Rs.	a.	p.
127	1926	Elephant Grass—a new and useful Fodder Crop in Western India.	0	1	0
128	1926	Cotton Cultivation in Sind	0	3	0
129	1926	The Treatment of Patches of Inferior Tobacco in Northern Gujarat	0	1	6
130	1926	Some Useful Forest Trees and Shrubs of the Coastal Tract and their Fodder Value	0	8	0
131	1926	The Fig Industry of Asia Minor	0	4	6
132	1926	The Improvement of Tobacco in Northern Gujarat ..	0	4	0
133	1926	Work of the Ganeshkhind Botanical Garden and Modibag Garden in 1921-1925	0	2	0

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